

UNIVERSITY OF ALBERTA LIBRARY



0 0002 3119 621

HC
117
A3
A363
1958
C. 5

EDUC

Ex LIBRIS
UNIVERSITATIS
ALBERTAEASIS





Courtesy of Canadian Aero Service Limited
and Spartan Air Services Limited

'ALBERTA' -

Province of Opportunity

★★★

— SUBTITLE —

A survey of the resources and facilities offered to industry by the Province of Alberta, of its present industrialization, and of future probable growth and industrial opportunities in the Province.

★★★

PRESENTED BY

CALGARY POWER LTD.

★★★

Calgary, Alberta

1958

PRINTED IN ALBERTA BY



LIBRARY OF THE UNIVERSITY
OF ALBERTA

CALGARY POWER LTD.

CALGARY
ALBERTA

Calgary Power Ltd. is pleased to present this survey and assessment of the resources of the Province of Alberta and its industrial potential.

This study was commissioned in the hope that it would help

- to interest industrialists in the many opportunities that Alberta offers,
- to provide background material for all those who wish to be better informed about Alberta, and
- to aid in planning the power facilities of the Province.

This survey summarizes a number of reference papers which deal with the topics discussed here in much greater detail. Should you require further information on any of the subjects referred to, please write:

Director of Industrial Development,
Calgary Power Ltd.,
140 First Ave. West,
Calgary, Alberta.



G. A. Gaherty,
President.

CONTENTS

CHAPTER	PAGE
I. ALBERTA'S PROGRESS AND PROMISE	3
II. THE PHYSICAL BACKGROUND: ALBERTA'S RESOURCES	11
III. FACILITIES AND SERVICES FOR INDUSTRY	63
IV. ELECTRIC POWER AND PRIMARY INDUSTRIES	131
V. ALBERTA'S MANUFACTURING INDUSTRIES	173
VI. ALBERTA'S SERVICE INDUSTRIES	217
VII. FUTURE INDUSTRIAL GROWTH	235
VIII. RECOMMENDED INDUSTRIES FOR FUTURE EXPANSION	255
IX. SITES FOR INDUSTRY: THE CITIES OF ALBERTA	265

ACKNOWLEDGMENTS

This survey was prepared by the Economic and Market Research Department of J. T. Donald & Co. (1956) Limited, under the direction of Dr. J. R. Donald, O.B.E., and C. R. Graham, B.Sc., M.A. Various parts of the study were prepared by E. F. Beach, Ph.D.; M. B. Ballabon, Ph.D.; D. L. MacFarlane, Ph.D.; D. C. Wellington, B.Sc.; and C. K. Murray.

The kind co-operation and assistance of the following departments and agencies, associations, firms and individuals is also gratefully acknowledged. While they bear no responsibility for the final document, their kindness in providing data, granting interviews, and reviewing portions of the work has contributed greatly to it:

Alberta Government Telephones; Alberta Motor Transport Association; Alberta Power Commission; Alberta Wheat Pool; Alberta Government, Departments of Agriculture, Economic Affairs, Education, Highways, Industries and Labour (including many special services rendered by the Alberta Bureau of Statistics), Lands and Forests, Mines and Minerals, Municipal Affairs, Provincial Secretary, Public Health, Public Welfare, Water Resources; St. Mary and Milk Rivers Development; Alberta Ytong Manufacturing Co. Ltd.; Alpha Jersey Dairy; Anchor Wire Co. Ltd.; Anglo American Explorations Ltd.; Burns & Company; Burns and Dutton Concrete and Construction Co. Ltd.; Cadomin Lumber Co.; Calgary Albertan; Calgary Brewing & Malting Co. Ltd.; Calgary Herald; Calgary Steel Tank Ltd.; Calgary Stock Exchange; Canada, Departments of Agriculture, Mines and Technical Surveys, Northern Affairs, and National Resources, Transport; Canada Metal Company; Canadian Bank of Commerce, Geological Department; Canadian Lightweight Aggregates Ltd.; Canadian National Railways; Canadian Pacific Air Lines Ltd.; Canadian Pacific Railway Company, Canadian Petroleum Association; Canadian Western Natural Gas Co.; Cities of Calgary, Camrose, Drumheller, Edmonton, Grande Prairie, Lethbridge, Medicine Hat, Red Deer, Wetaskiwin; Coal Operators' Association of Western Canada; Consolidated Mining & Smelting Co. of Canada Ltd.; Continental Can Company; Crane Limited; Dominion Bureau of Statistics;

Eastern Rockies Forest Conservation Board; Alberta Labour Unions; Electric Storage Battery Co. (Canada) Ltd.; Executive Counsel of Alberta; Foothills Steel Foundry & Iron Works Ltd.; Gold Medal Feeds Ltd.; Golden Arrow Sprayers Ltd.; Great Western Garment Co. Ltd.; Gypsum Lime & Alabastine Canada Ltd.; Hinde and Dauch Paper Company of Canada, Limited; Hudson's Bay Oil & Gas Co. Ltd.; Husky Oil Company; Hyeroft China Ltd.; I.K.O. Asphalt Roofing Products Ltd.; Imperial Oil Limited; Independent Biscuit Company; Irving Engineering & Construction Ltd.; Mr. J. W. Judge; Dr. Lawrence E. Kint; Lethbridge Iron Works Co. Ltd.; Mannix Ltd.; Mr. Marvin W. Maxwell; McGill University; Medicine Hat Brick & Tile Company; Midland Coal Mining Co. Ltd.; Mountain Minerals Ltd.; National Porcelain Company; C. O. Nickle Publications; Noble Cultivators Ltd.; Northern Alberta Railways Co.; Northern Plywoods Ltd.; Northern Transportation Co. Ltd.; Northwest Orient Airlines; Osler Hammond & Nanton; Peace River Glass Co. Ltd.; The Petroleum and Natural Gas Conservation Board, Alberta; Pillsbury (Canada) Ltd.; Pioneer Electric (Alberta) Ltd.; Pioneer Feeds Ltd.; Polychemical Industries Ltd.; Poole Construction; Purity Flour Mills Ltd.; Rangeland Pipe Line Co. Ltd.; Refinery Vessels & Maintenance Ltd.; James A. Richardson & Co.; Robinson Machinery & Supply Co. Ltd.; San Juan Tool Co. Ltd.; Seale Grain Company Limited; Stramit Corp. (Alberta) Ltd.; T.I.W. Western Limited; Trans-Canada Air Lines; Unemployment Insurance Commission; Union Packing Co.; United Apparel Ltd.; United States Department of Agriculture; University of Alberta; Mr. G. A. Vissac, P.Eng.; West Canadian Collieries; Western Airlines; Western Gypsum Products Ltd.; Western Plywood Co. Ltd.; Western Water Wells Limited; Woods Manufacturing Co. Ltd.; Yellowknife Transportation Co. Ltd. and others who contributed information and advice in the preparation of this report.

The aero relief map of Canada reproduced in part as the frontispiece is copyrighted by Canadian Aero Service Limited and Spartan Air Services Limited, 1603 Centre Street North, Calgary, Alberta, and may not be reproduced without permission.

CHAPTER I

ALBERTA'S PROGRESS AND PROMISE

	Page
Perspective on the Boom	3
A Unique Area: Unique Opportunities	3
Perspective on Alberta	4
Resources for the Future	5
Alberta's Economy — Today	5
The Manufacturing Area	6
Gross Value of Production, Alberta Manufacturing Industries	6
Alberta's Future	6
Net Value of Production	7
Forecast of Percent Increase in Gross Production	7

CHAPTER I

ALBERTA'S PROGRESS AND PROMISE

Any industrialist considering a new Canadian project owes it to himself to visit Alberta personally and absorb its atmosphere at first hand. It is, of course, one of the finest vacation lands to be found anywhere — with its grand Rocky Mountain resorts, its pulsing Stampede atmosphere, its rich farms and modern cities — and no trip to Alberta can help but be partly a refreshing vacation. But there is much more than this. There is an atmosphere of enthusiasm and enterprise that the industrialist above all others will sense, and find intensely stimulating.

Perspective on the Boom

Twice in the fifty years since the birth of the province, Alberta has captured the imagination of a continent. The oil boom of today is the second boom; the first belonged to the agricultural pioneers.

The first was no mean boom. In terms of area, one-fifth of a continent was being opened up as settlers, usually getting their land free or for a nominal payment, spread through the Canadian West. In Alberta, population grew more than five-fold in the first ten years of this century — and the actual numerical population increase of some 300,000 was virtually equal to the increase in the ten exciting years from 1946 to 1956.

Then the province settled down to slower growth, and to development as an agricultural area — subject to all the vicissitudes of the world markets for wheat, its major product. Coal mining became important, and a few small pools of gas and oil were discovered; some industries, mainly based on the processing of agricultural products, were established. As the limits of irrigation were gradually pushed back, agriculture was diversified, irrigation was introduced and Alberta became stabilized as a mainly agricultural economy.

All this was changed one day in February, 1947, when a wildcat oil well near the town of Leduc "came in". A major Alberta oil field had been discovered. In succeeding years, even larger fields have been discovered. Oil and gas exploration has be-

come a major industry. Reserves have justified the building of gas and oil pipelines across the continent, westward to the Pacific, and linking with systems in the United States. Some of Canada's largest petrochemical operations have been established. These activities have spawned others: new cement plants, steel fabricating mills, greatly increased power production, expanded road-building programs, and a major boom in commercial and residential construction are only a few.

While the population of the United States increased by some 19 per cent between 1946 and 1956, and that of Canada by about 30 per cent, Alberta's population was climbing by 40 per cent. Edmonton and Calgary, the two major cities, in the last five years have had the highest growth rates of any Canadian metropolitan areas. There are many other figures which might be quoted, but they belong in later chapters. The general picture is clear: major discoveries in one major resource area have wrought great changes in a primarily agricultural economy; capital and people have streamed into the province to exploit oil and gas; industries that can profitably use these resources as raw materials, or that can supply their requirements in exploration, production and transmission phases have followed; other local industries have been established and have flourished in the period of boom. The boom must now be consolidated and an enquiry into that consolidation is a basic object of this entire study. But first, let us sketch in slightly more detail the situation of Alberta.

A Unique Area: Unique Opportunities

Alberta is unique, and comparisons with other areas must be made with care. Alberta has been called 'a second Texas', and in the minds of those who know her only slightly or superficially, this may have seemed an appropriate term. For publicity purposes, it could be; for purposes of industrial evaluation, it is not. Alberta and Texas are two different areas; probably their major differences lie in their very unlike geographic situations, and the fact that each forms part of a widely differing national economy.

Texas is on tidewater, while mountains lie between Alberta and the sea. Texas goods may be sold in the large United States markets; Alberta goods are sold in the smaller Canadian markets, or exported. These differences in transportation facilities and available market size mean that the industrialist who thinks of Alberta as another Texas will be starting his plans with the wrong premise. The parallels exist, but the differences are many.

The parallels are in one major field: within recent years, discoveries have revealed Alberta to be one of the great storehouses of gas and oil in the free world. These reserves, as in Texas, provide the means of supplying vast areas by pipeline with fuel and energy. And as in Texas they can form and are forming the basis of industrial expansion, both by providing low-cost energy and by providing raw materials for such industries as petrochemical manufacture.

The differences, aside from the two already mentioned, may be seen after more careful examination. Not in Texas, nor elsewhere in the world, are major metallic reserves so closely adjacent to major power reserves; the metals output of Alberta, from ores flowing from the north, will see a tremendous expansion. And not in Texas or elsewhere is the long-term energy picture so favorable. Alberta has nearly twice the coal reserves of Texas, and in addition has the vast energy reservoir of the Athabasca oil sands. While agriculture is important to Texas, Alberta has for many years been one of the world's major grain producers, as well as a land of cattle ranches and irrigation farms. And while Alberta is commonly thought of as a "prairie" province, her forest reserves can support major pulp and paper developments.

Other differences will emerge as the story of Alberta is unfolded here. But from this point on, differences will not be emphasized. It is the advantages of Alberta and the opportunities offered by Alberta that the reader is asked to consider and judge. But the major thought deserving emphasis here is that Alberta is a young land of industrial opportunity. Alberta's industrial boom is a little more than a decade old, and her unexploited potentialities are varied and vast. It is our hope that having read of them, you will come to investigate — and stay to produce.

Perspective on Alberta

The westernmost of Canada's three Prairie

Provinces, Alberta is bounded by Saskatchewan on the east; to the west, British Columbia lies between her and the sea. The bordering state on the south is Montana, and she stretches north to the Canadian Northwest Territories. Alberta contains between six and seven per cent of the area of Canada — 255,285 square miles, of which 248,800 square miles is land area. This means that the province is nearly as large as Texas; or to use another comparison, equal to the combined area of France, Belgium, The Netherlands, and Denmark. It extends 756 miles north from the United States-Canadian border at the 49th parallel to latitude 60° north, or about from the latitude of Paris, France, to that of Oslo, Norway. The width of the province varies from 182 to 404 miles.

The characteristic weather is what is popularly known as a prairie type of climate, somewhat cooler, drier, and sunnier than climates typical of other inhabited areas of Canada. Central and Southern Alberta have mid-winter temperatures warmer than half the world's land mass between the same latitudes, and are certainly warmer than similar latitudes in Eastern Canada. The mid-summer temperatures indicate the province is almost 10°F. warmer than the world mean for these latitudes at that season.

Edmonton, the largest city of Alberta and seat of the Provincial Government, is 761 miles from the ice-free Pacific port of Vancouver, British Columbia, and 1,220 miles from the westernmost Great Lakes port of Fort William. Churchill, the terminus of the Hudson Bay water route to Europe, is 1,144 miles distant. The province is crossed by the lines of the two Canadian transcontinental railway systems, while the Northern Alberta Railways tap the rich northland. The history of Alberta was shaped by the transcontinental lines, for the province was opened up to large-scale settlement only when they were built in the late 19th and early 20th centuries.

Nominally a "prairie" province, Alberta is indeed largely a land of rolling plains — on which grow the world's finest wheat and grains, and beneath which lie the fabulously oil-rich sediments. To the west, however, her area includes the eastern foothills, slopes and some of the most spectacular peaks of the Rocky Mountains. Within her boundaries lie the two world-famous national parks of Jasper and Banff. And going northward, the grassland gives place to forest and this "prairie" province

proves to have nearly one-tenth of the lumber resources of all Canada. The rocky Canadian Shield touches only one small north-east corner, but it lies, with its great mineral wealth, to the north and northeast of the province which has access to it by water, road and rail. Already minerals of the Shield are coming to Alberta for refining.

This, then, is Alberta today: a land of many farms and ranches, of mountain grandeur and spreading forests; a land of rapidly-running rivers flowing down from the Rockies; a province of over 1,100,000 persons, with two major metropolitan areas and a multitude of smaller cities, towns and villages. And every day new oil derricks rise, and the pipelines snake a little further across the land.

Resources for the Future

No one believes that Alberta's resources have all, by any means, been uncovered; the rate of discovery of petroleum, for instance, is expected to run at about 300 million barrels, per year for at least the next two decades. Some idea of the major available resources, as estimated today, may be gained from this tabulation:

Mineable coal reserves	48,000 million tons
Remaining recoverable proven reserves, crude oil - -	3,100 million barrels
Remaining recoverable proven reserves, natural gas -	21,000 billion cubic feet
Estimated crude oil content, Athabasca oil sands - -	100-300 billion barrels
Undeveloped hydroelectric potential - -	2,500,000 kilowatts
Potential additional arable land -	15,800,000 acres
Merchantable timber reserves -	53,000 million cubic feet

In addition, salt is found at many points in underground strata, and very large quantities of sulphur are available from sour natural gas reserves. In general, non-metallic minerals are available in the province; most metals are not found in the province, but are found in abundance in the Northwest Territories just to the north and the logical route to their utilization lies through Alberta.

Alberta's Economy - Today

Again, a brief table will help the reader visualize the changes that have so recently taken place in Alberta's industrial picture, and the situation that prevails today. These are the net values of production in the major areas of economic activity:

	1946	1956
	(millions of dollars)	
Agriculture - - -	249	397
Mining (includes oil and gas) -	65	373
Manufacturing - - -	84	292
Construction - - -	65	399
Forest Products - -	5	9
Electric Power - - -	9	35

It is evident that ten years ago the value of agricultural output was greater than the value of all other economic activity combined. Alberta has now reached the point where construction activity has passed agriculture, and mining at its present rate of increase should soon do the same. Manufacturing, though not yet with the leaders, has come a great distance.

The Manufacturing Area

The consolidation of the boom at a high level of economic activity and employment demands the continued expansion of industry, and especially

secondary industry. The basis for this expansion clearly exists. The 1946-1956 decade has seen many basic industries established or their output greatly increased. The picture for 1955, 1956, 1957 is given in slightly more detail:

GROSS VALUE OF PRODUCTION, ALBERTA MANUFACTURING INDUSTRIES

INDUSTRY GROUP	Value Millions of Dollars			1955 Percentage of Total	1957 Percentage of Total
	1955 ¹	1956 ²	1957 ³		
Foods and beverages - - - - -	273	294	309	43	41
Products of petroleum and coal - - - -	116	132	135	18	20
Wood products - - - - -	57	56	56	9	7
Iron and steel products - - - - -	41	53	63	6	8
Chemicals and allied products - - - -	37	35	43	6	5
Non-metallic mineral products - - - -	33	33	33	5	4
Printing, publishing and allied industries - -	21	22	24	3	3
Transportation equipment - - - - -	19	25	27	3	4
Non-ferrous metal products - - - - -	15	17	22	2	3
Pulp and paper products - - - - -	10	12	18	2	2
Other manufacturing industries - - - - -	19	23	22	3	3
Total - - - - -	641	702	752	100	100

It is also noteworthy that in the period 1939-1956, Alberta led all other provinces in her percentage increases in: employment in manufacturing, earnings in manufacturing, and value added by manufacturing. But this rate of progress is entirely likely to be surpassed in the future. The picture shown is one of limited development to date—witness the heavy domination of the group by the food and beverage industry—a holdover from the past; the relatively infant development of the wood-using industries, the chemical industries, non-ferrous metal industry, and all the industries not separately classified. In many areas, clearly, much opportunity still lies.

Alberta's Future

The expansion of Alberta will continue partly because her own population will expand (more than two million persons expected by 1975) and form an increasing market and because her resources will allow the establishment of low-cost industries to supply markets in the rest of Canada and throughout the world. This expansion depends on permissive factors as well; careful attention must be paid to keep all production costs at reasonable levels. It must be encouraged by enlightened freight rate and tariff policies of the Federal Government. It cannot be doubted that the promise of Alberta will continue to attract ample capital for development, and the industrialists, technologists and researchers who will expedite it. The situation about two decades from now should be this:

¹ D.B.S. Final Figures.
² D.B.S. Preliminary Figures.
³ A.B.S. Estimate.

NET VALUE OF PRODUCTION: MAJOR ECONOMIC SECTORS

										1975 (millions of dollars)	Ratio of Increase 1954/1975 1955/1975	
Agriculture	-	-	-	-	-	-	-	-	-	450	1.49	1.40
Construction	-	-	-	-	-	-	-	-	-	1,000	3.3	2.95
Manufacturing	-	-	-	-	-	-	-	-	-	800	3.7	3.04
Mining	-	-	-	-	-	-	-	-	-	1,600	5.3	5.27
Electric Power	-	-	-	-	-	-	-	-	-	120	4.7	4.15
Forestry	-	-	-	-	-	-	-	-	-	30	3.49	2.27
Other	-	-	-	-	-	-	-	-	-	3	1.76	1.11
Total	-	-	-	-	-	-	-	-	-	4,003	3.6	3.14

What of the vital area of manufacturing? To point further to the directions in which opportunity lies, these forecasts of expansion have been made:

INDUSTRY GROUP	Per cent Increase in Gross Production 1955-1975											
Foods and beverages	-	-	-	-	-	-	-	-	-	-	-	105
Products of petroleum and coal	-	-	-	-	-	-	-	-	-	-	-	219
Wood products	-	-	-	-	-	-	-	-	-	-	-	75
Iron and steel products	-	-	-	-	-	-	-	-	-	-	-	388
Chemicals and allied products	-	-	-	-	-	-	-	-	-	-	-	468
Non-metallic mineral products	-	-	-	-	-	-	-	-	-	-	-	279
Printing, publishing and allied industries	-	-	-	-	-	-	-	-	-	-	-	210
Transportation equipment	-	-	-	-	-	-	-	-	-	-	-	216
Non-ferrous metal products	-	-	-	-	-	-	-	-	-	-	-	500
Pulp and paper products	-	-	-	-	-	-	-	-	-	-	-	1,100
Other manufacturing industries	-	-	-	-	-	-	-	-	-	-	-	426
Total	-	-	-	-	-	-	-	-	-	-	-	212

This is only a preliminary sampling of the contents of the following chapters. Alberta's resources and facilities are therein examined in considerable detail, her industries inspected and analysed, and the forecasts of her future given in detailed, justified form. There are also discussions of specific industrial opportunities of definite promise; of sites for industry in Alberta.

The destinies of individual industries and firms

depend on a correct interpretation of present conditions and a correct forecast of future trends. Required for this is not only an intimate knowledge of the industry concerned, but insight into the whole economic situation. This insight must be based on information and predictions that are comprehensive in scope and meaningfully interpreted. It has been a prime objective of this study to meet this need for significant information and informed forecasting.

CHAPTER II

THE PHYSICAL BACKGROUND: ALBERTA'S RESOURCES

	Page
Location	11
Climate	11
Climate and Industry	11
Climate and Agriculture	12
Climate and the Individual	12
Topography	21
General Geology	21
Economic Geology	29
Petroleum	29
Natural Gas	30
Athabasca Oil Sands	39
Coal	39
Sulphur	39
Salt	40
Potash	40
Limestone and Dolomite	40
Silica Sand	40
Clay and Shale	41
Bentonite	41
Gypsum	41
Iron Ore	42
Other Minerals	42
Other Deposits of Significance	42
Water Resources	43
Water Sources and Drainage Systems	43
Stream Flow	44
Ice, Thaw and Flooding	44
Water Quality	44
Water and Agriculture	44
Soils	54
Soils and Construction	54
Natural Vegetation	57

CHARTS AND MAPS

	Page
Climate of Alberta: January Mean Temperature	13
July Mean Temperature	13
Temperature Extremes 1921-50	13
Mean Daily Maximum Temperatures - July and January	13
Average Length of the Frost Free Period	15
Mean Annual Total Degree-Days (65° base)	15
Expectancy of Years with Serious Drought Damage	15
Freezing Indices: Days below 32°F.	15
Mean Annual Precipitation	17
Mean Monthly Temperature various cities	19
Topography of Alberta: Physiographic Regions	13
General Geology of Alberta: General Areal Geology	15
General Geology of Alberta: Diagram	17
Economic Geology of Alberta: Major Oil and Gas Fields	11
Table of Formations	13
Coal Bearing Formations	15
Isopachs of Total Salt Thickness	17
Water Resources: Main Streams and Drainage Systems	15
Annual Stream Flow	17
Mean Monthly Hydrographs of Major Streams	19
Mean Annual Evaporation from Large Lakes and Reservoirs	11
Soils of Alberta	11
Natural Vegetation of Alberta: Zones of Major Vegetation Types	11

TABLES OF INFORMATION

Geological Sequence - - - - - Table I	22
Natural Gas Reserves of Major Gas Fields, Alberta - - - - - Table II	30
Maximum, Minimum and Mean Daily River Flows for Annual Periods - Table III	33

CHAPTER II

THE PHYSICAL BACKGROUND: ALBERTA'S RESOURCES

Natural resources and physical environment are the basic factors determining the location of economic activity. The dominant factor may be geography, as when a fine port or important river junction means the growth of a major trading centre; it may be climate, which affects not only the success of agriculture but the vitality of the

people; or the most important reasons for population and industry growth in an area may be found in its vegetation, its soils, water resources or minerals. In most cases all these factors exert some influence. This chapter examines, therefore, the physical environment and resources of Alberta.

LOCATION

In the continent of North America, Alberta occupies a northwestern interior location. Its southern border, like that of all Canada, is somewhat above the midline of the continent; its northern extremity is less than 500 miles below the Arctic Circle. Access to the Pacific Ocean is through the ports of British Columbia, more than 700 miles from the major centres of Alberta, and to the Atlantic by crossing the Canadian prairies

to Hudson Bay or the Great Lakes-St. Lawrence system, some 1,200 miles distant. Her area of some 255,000 square miles is exceeded by the provinces of Quebec, Ontario and British Columbia, but only by the state of Texas in the United States. The states of Idaho, Montana and Wyoming immediately south of the Canadian border have quite similar, though more southerly, locations.

CLIMATE

North Americans, whose weather has wide extremes and wide variability, find it a topic not only for conversation but for concern. The farmer is perhaps most affected by climate—rainfall, frost-free days, hours of sunshine, and other factors. The industrialist must consider the effects of climate on construction costs and movement of goods, and

perhaps also on such things as the temperature of process water and frost penetration. Any individual is concerned with the effect of the weather on his personal comfort, and on the expense of protecting his person and his goods from the elements.

Climate and Industry

Industry in Alberta is presented with no more difficulties caused by weather than industry in other parts of the northern half of North America; in some particulars, the difficulties are less.

In winter, low temperatures must be guarded against; outside lines must be protected against freezing, and other similar precautions taken—but this is common practice throughout most of Canada. While extreme winter temperatures of 50 to 60 degrees below zero Fahrenheit have been recorded in the past thirty years, mean daily temperatures in January have averaged from minus fifteen in the north to plus ten in the south of the

province in the same period. Similarly, while the highest summer temperatures in the south of the province may reach 100 degrees, the mean daily temperatures in July are from 75 to 80 degrees.

Degree-days, obtained by assigning to any day a value equal to the number of degrees by which the mean temperature falls below 65°F., is often used by engineers to measure heating requirements. Using this standard, heating requirements in Alberta are not exceptionally high. Degree-days per year rise from 8,000-9,000 in southwest Alberta to 15,000 in the northeast corner. Fuel needs in the main settled areas are above those of British Columbia, but below those of Saskatchewan and Manitoba. Southern Alberta figures are com-

parable with those for southwest Quebec and eastern Ontario.

Problems of weathering and corrosion are minimized by the generally low humidity of the atmosphere. The fact that only about one-quarter of annual precipitation falls as snow lessens winter problems of transporting goods and personnel; Alberta's annual snowfall is only about half that experienced in the populated parts of Quebec, the Maritime Provinces, and the upland section of British Columbia. The depth of maximum snow cover is also only about half that of Southern Ontario and Quebec. The demands made by snow on roof construction are thus more moderate in Alberta than in most other parts of Canada. There are long periods during the winter in southern Alberta when there is no snow cover.

One disadvantage of extreme winter temperatures combined with light snow cover is relatively deep frost penetration. In severe winters when no snow cover exists, frost penetration at Calgary may reach thirteen feet in the gravels beneath city streets. The effect on construction activities is to limit outside work, as in most other parts of Canada. Sewer, water and bridge work can however be continued, except on days when the temperature falls below zero. Most types of building construction can be carried on without interruption, even when excavation for foundations is necessary. New techniques, such as shielding open roofs or walls with polyethylene film, permit work to be carried on while the enclosed area is inexpensively heated with natural gas.

Climate and Agriculture

An indication of the suitability of Alberta's climate for agriculture is the fact that permanent agricultural settlement reaches its farthest northern point in Canada in the Peace River district. The favourable combination of long hours of sunlight, a sufficient number of frost-free days and adequate precipitation, which permits this situation, is increasingly evident as one moves southward through the province, until finally near its southern border more arid conditions prevail.

Annual total hours of bright sunshine, which average 1,600 to 2,000 hours in the inhabited areas of Eastern Canada, are from 2,000 to more than

2,200 hours throughout almost all Alberta. Frost-free days in the agricultural areas of the province vary from 80 to over 160 days. The shorter period requires prompt planting and early-maturing crops, but any period over 90 days permits the farmer some latitude. The actual growing season varies from about 140 to 190 days.

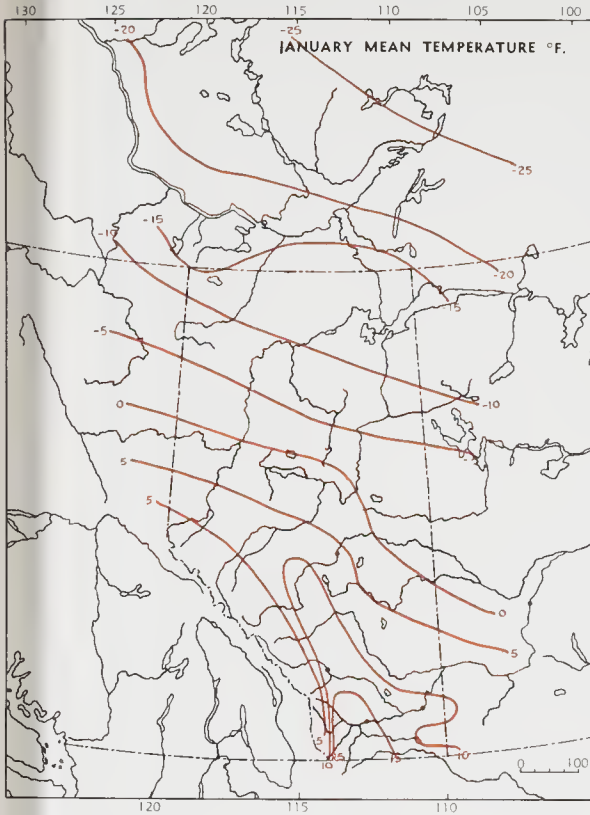
Rainfall in most years is adequate over all of Alberta except in the southeast area of the province, where aridity is a problem to agriculture. Fortunately, the seasonal pattern of precipitation favours the farmer. The prairies have the lowest mean annual snowfall of any major area of Canada, and most precipitation occurs as rain. Over most of Alberta, about 50 per cent of the year's precipitation normally falls in April, May, June and July—the growing season. When the rainfall of the previous August, September and October is added, the total is regarded as the crop-season rainfall, and usually amounts to three-quarters of total annual precipitation.

In much of the richest farming area of the province, past weather records yield the probability that there will be no more than two seasons of damaging drought in the working lifetime of an average farmer; in the southern areas of the province where this expectancy reaches ten years of his active life, irrigation farming is largely practised or cattle ranching takes the place of grain-growing.

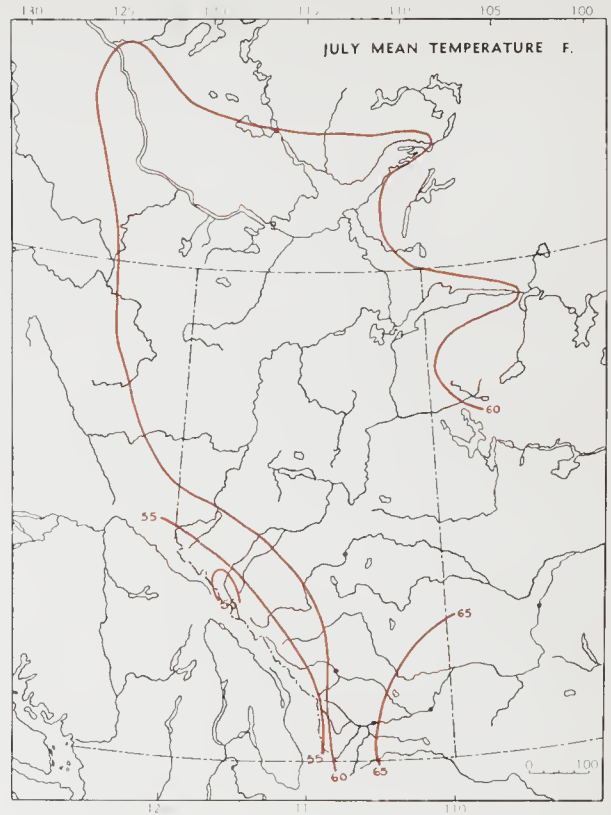
Climate and the Individual

Alberta, one of the sunniest areas of Canada, has a climate that can best be described as exhilarating. Summer temperatures are pleasantly, not excessively warm, and the humidity is much lower than that which causes summer discomfort in major centres in other parts of the continent. Clear skies make summer nights pleasantly cool. In winter, though the temperature occasionally drops to low levels, the cold is tempered by bright sunshine and, again, by the low humidity. Wind-chill must be guarded against, but adequate clothing and shelter permit outdoor work in comfort on most days. From Calgary south, that amazing warm wind, the Chinook, can raise mid-winter temperatures to well above freezing in the space of a few hours—an experience never to be forgotten.

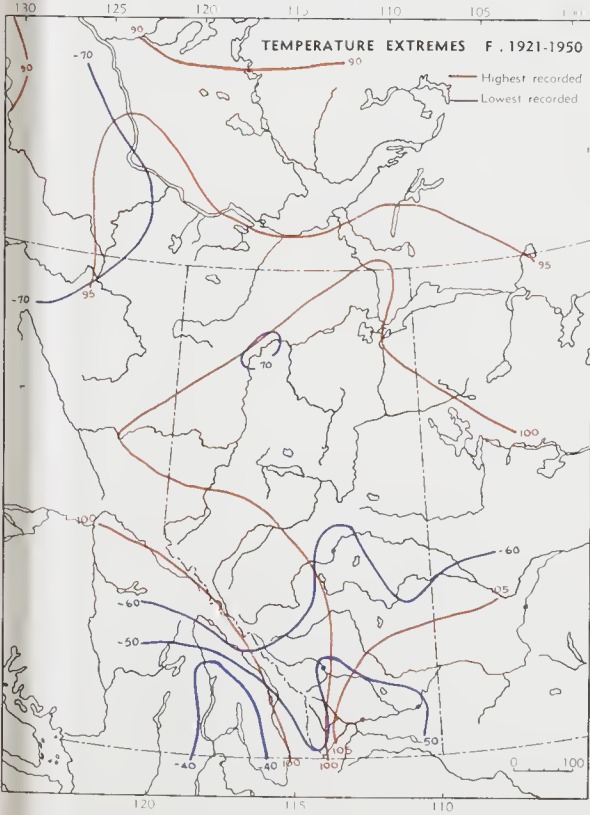
CLIMATE OF ALBERTA



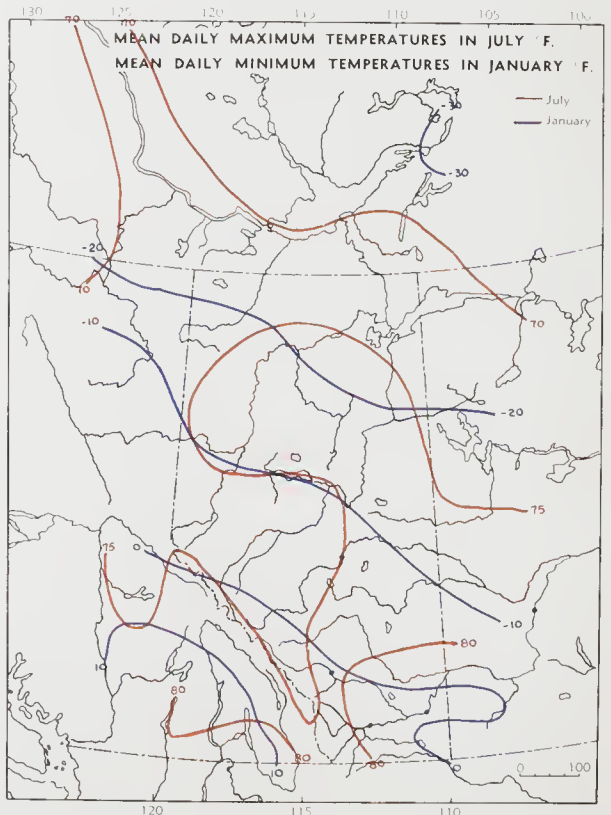
CLIMATE OF ALBERTA



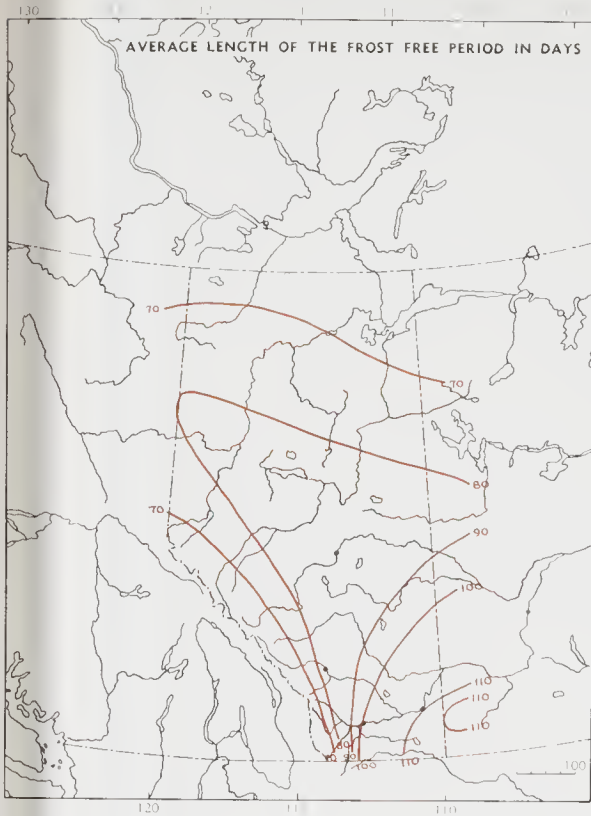
CLIMATE OF ALBERTA



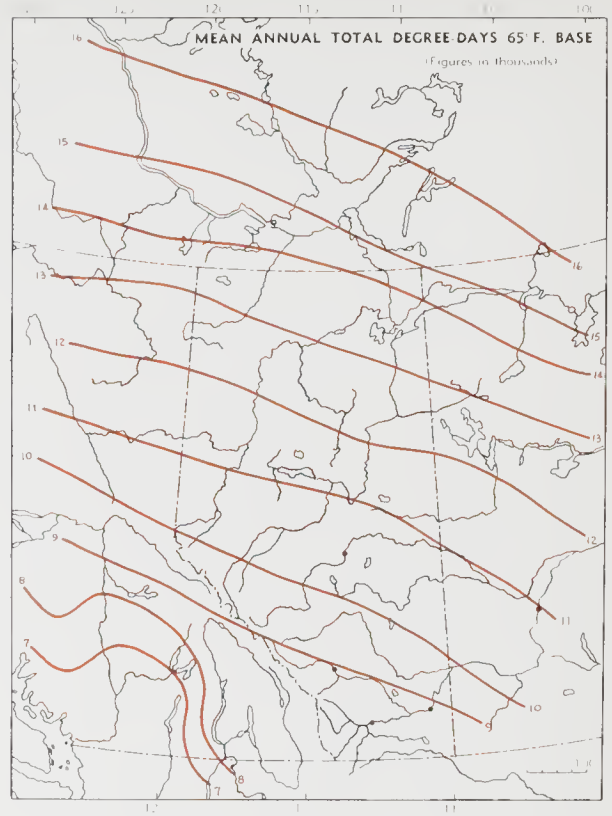
CLIMATE OF ALBERTA



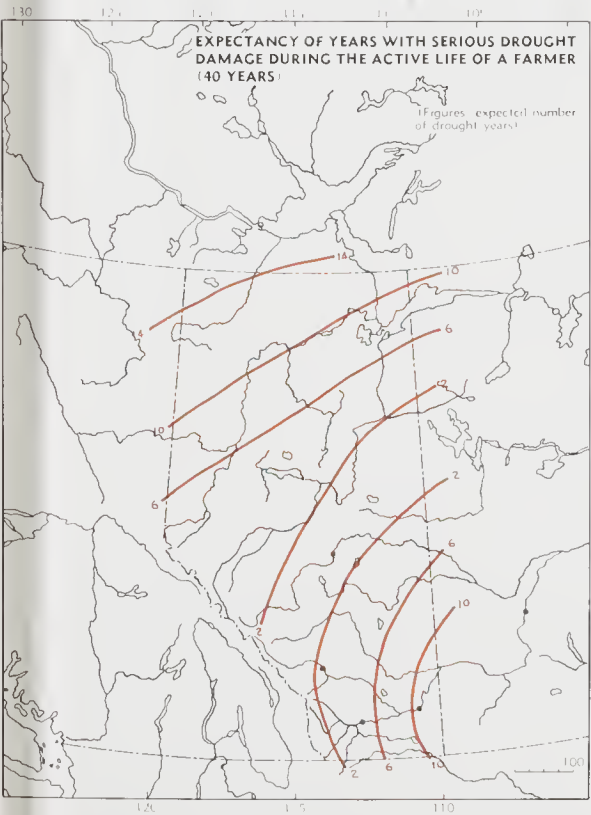
CLIMATE OF ALBERTA



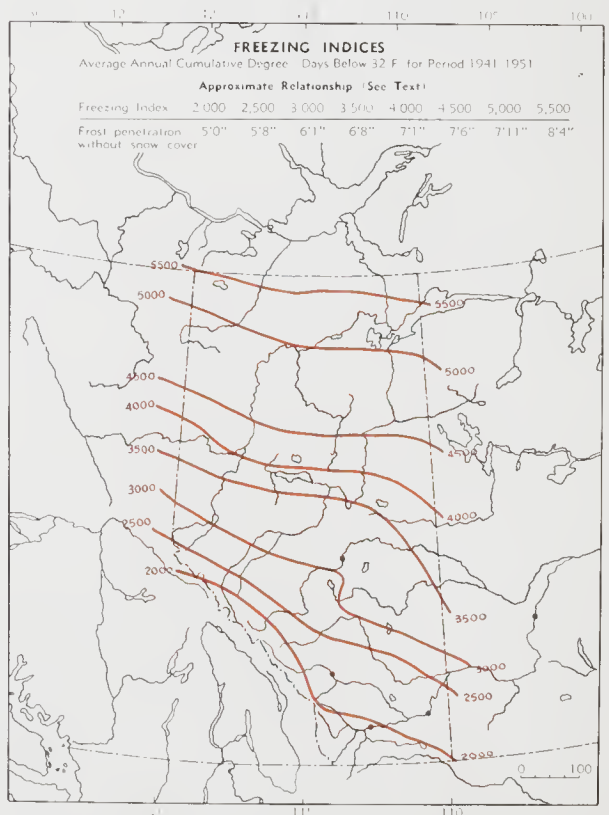
CLIMATE OF ALBERTA



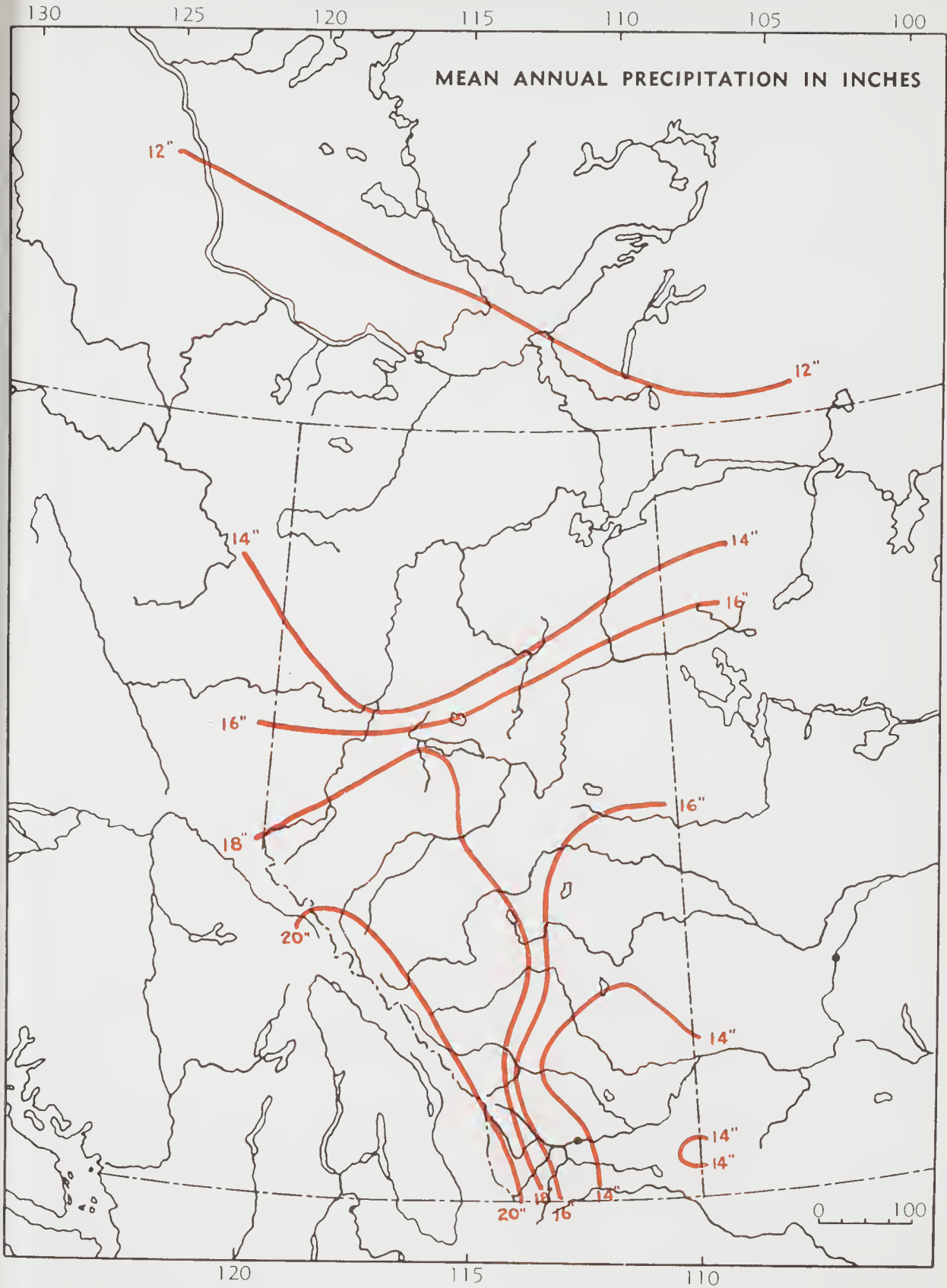
CLIMATE OF ALBERTA



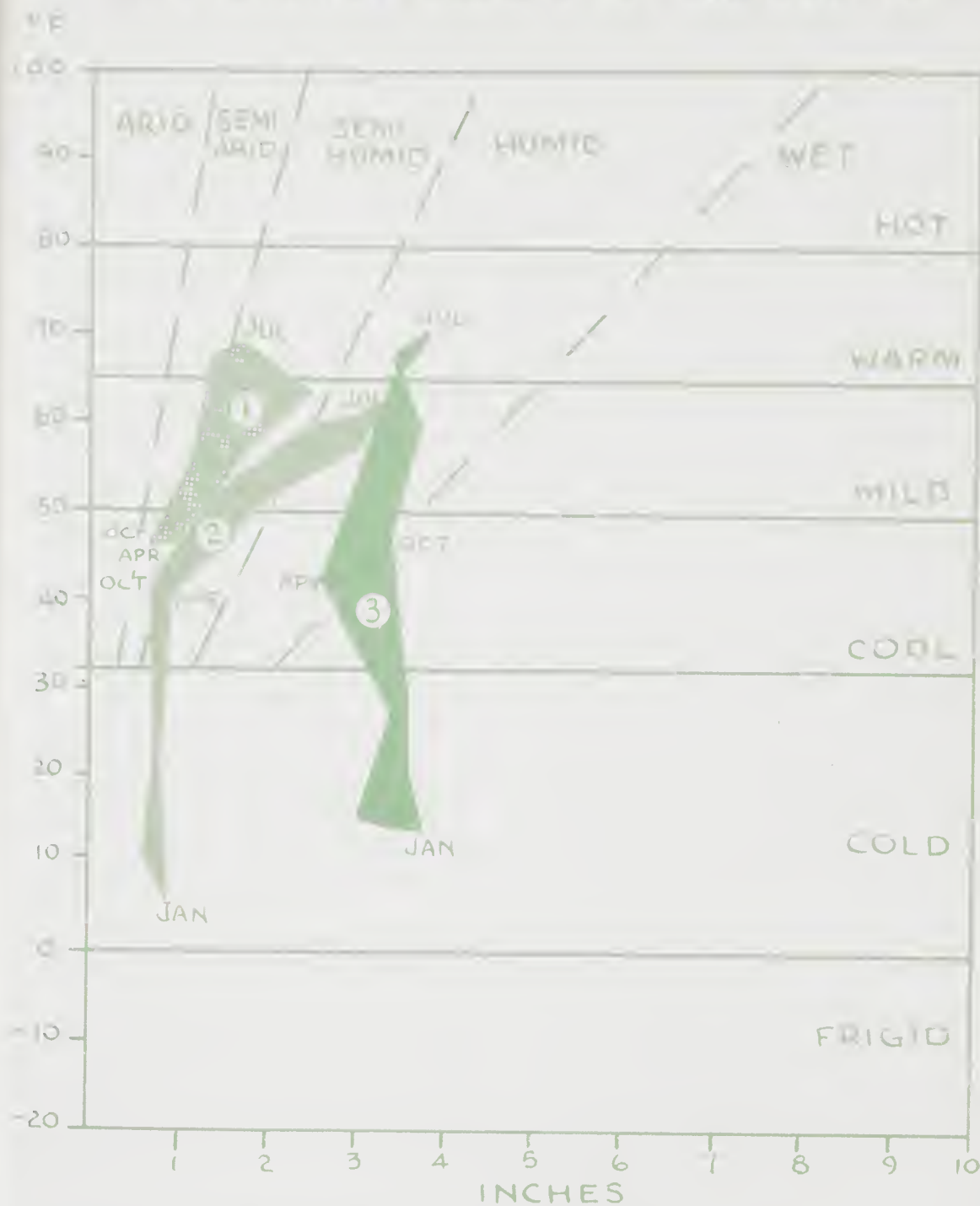
CLIMATE OF ALBERTA



CLIMATE OF ALBERTA



MEAN MONTHLY TEMPERATURE AND PRECIPITATION FOR EDMONTON MEDICINE HAT AND MONTREAL



- ① MEDICINE HAT April to October Only
- ② EDMONTON
- ③ MONTREAL

TOPOGRAPHY

Alberta has the most varied landscape of any Canadian province. In fact, it is doubtful whether any geographic division on the continent can equal the combination of plain, foothill and mountain enclosed within its boundaries.

The Canadian Shield occupies a small area in the far northeast of Alberta. This gives place to the Great Plains, most of which is prairie either grassed or forested. To the west are the Rocky Mountain Foothills, and then the Rockies themselves.

Occupying only about three per cent of the province, the Canadian Shield of pre-Cambrian rock has the surface characteristics of a rocky, hilly plateau. The rock is only sparsely covered with overburden, and the area has subdued relief and abundant lakes.

The Great Plains is the system of lowlands and plateaux that occupies the heartland of North America from the Rio Grande to the shores of the Arctic Ocean. In Alberta a relatively small area is covered by the Saskatchewan Plain, but nearly all the inhabited area of the province falls in the Alberta Plain. The topography of these plains is inherited from the last Ice Age, which covered the whole region with boulder clay, gravels and silts.

The Alberta Plain tilts upward from east to west, rising at an average slope of from ten to twenty feet per mile. Contrary to popular opinions about the flat and level topography of the prairies, it has a highly varied local relief. The landscape is

typically rolling, with flat-topped uplands and deeply incised river valleys. Hills, less than 5,000 feet above sea level but rising markedly above the plains, are a conspicuous feature of southern, central and northern Alberta. Elsewhere, except where rivers have cut deep, steep-sided valleys into the soft sedimentary rocks, the whole area is covered with low hills, flats, small lakes and sloughs or ponds.

From the western area of the Alberta Plain the swell of timbered foothills and gleaming snow-capped peaks provide an unmatched view. The foothills cover about five per cent of the province. There is no sharp demarcation between foothills and plain; the country slowly becomes more rolling, the round-topped hills rise higher and more steeply. Then the hills become precipitous, jagged mountains and the Rockies have been reached. The peaks rise to over 12,000 feet, and their steep eastern faces bear remnants of glaciers which once extended into the plains. They stand in ranges running northwest-southeast, a succession of jutting, pyramid-shaped prominences. Only five practicable passes run through them to the Pacific; the lowest of these is 3,700 feet and the highest some 5,400 feet above sea level.

Within Alberta, in the Rocky Mountains, are three of Canada's most celebrated National Parks—Jasper, Banff and near the International boundary, Waterton Lakes. Some of the finest mountain scenery in the world is found here.

GENERAL GEOLOGY

A discussion of geological formations must necessarily make use of some technical terms. The reader who is not a professional geologist may wish to refer to Table 1, a summary of the sequence of major geological periods. Not all of these geological ages are represented in Alberta, but the table provides a useful key to the following remarks.

Most of Alberta is underlain by sedimentary rocks of Cenozoic, Mesozoic and Palaeozoic ages. These strata slope upward to the east, and appear at the surface according to age, until finally the base on which they rest—the pre-Cambrian, or Canadian Shield—is exposed in the northeast corner of the province.

The sequence of rocks rising to the surface in the southwestern part of the province is neither so simple nor in such logical, chronological order. More than 50 million years ago, in late Cretaceous and early Tertiary times, the Rocky Mountains were uplifted by intense compressive forces from the west. Strata from the west were overthrust on eastern bedrocks, and a complex pattern of folded and displaced sediments resulted. This appears in the Rockies and even more markedly in the foothills.

Later in Tertiary times, but still many millions of years ago, there was extensive warping of strata just eastward of this great upthrust from the west.

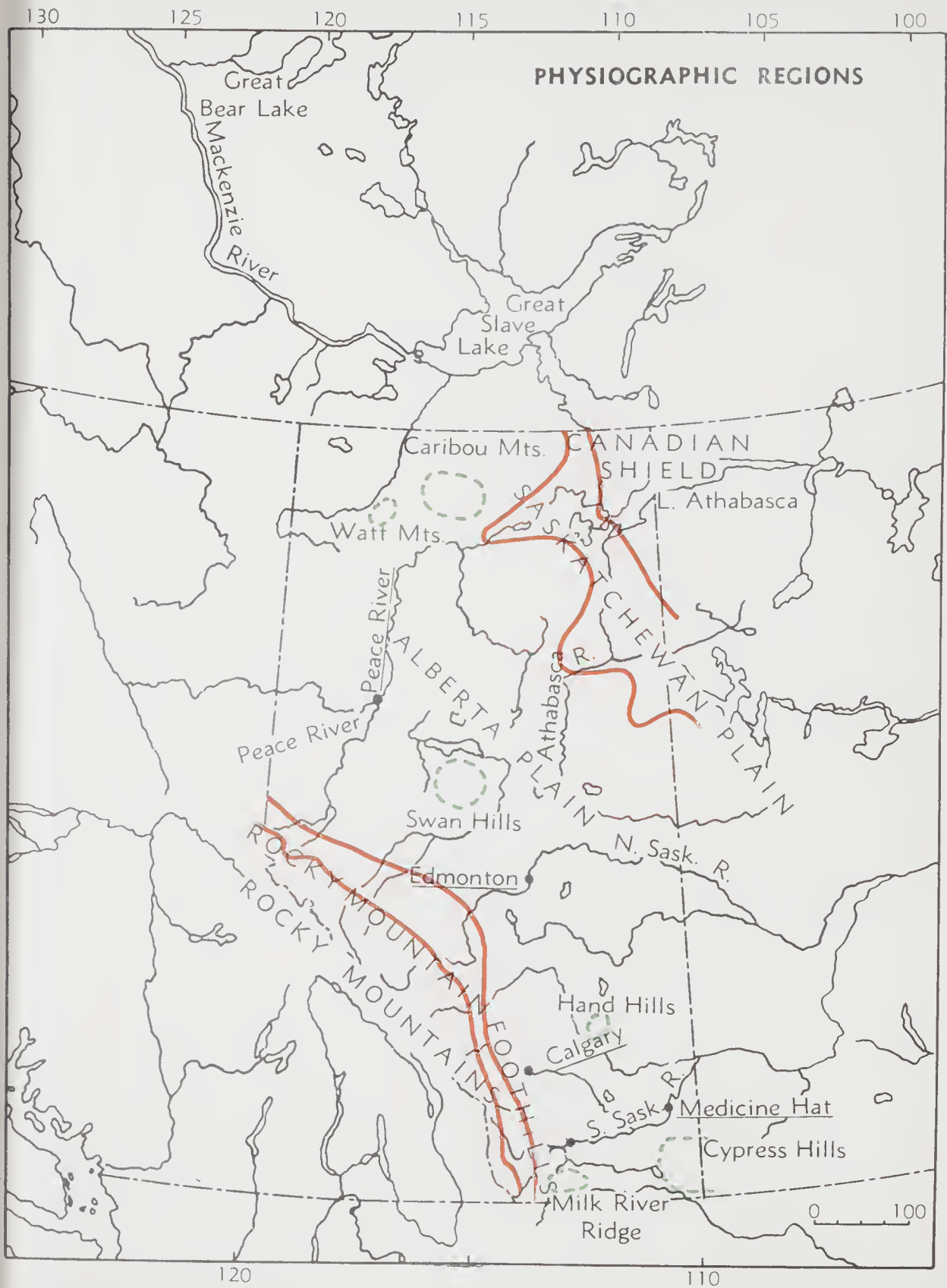
This warping formed the Alberta Syncline, a concave basin of sedimentary beds. Trapped in the eastern upward slope of the syncline were the oil

and gas that have formed most of the major Alberta discoveries.

TABLE I
GEOLOGICAL SEQUENCE
(Figures indicate millions of years)

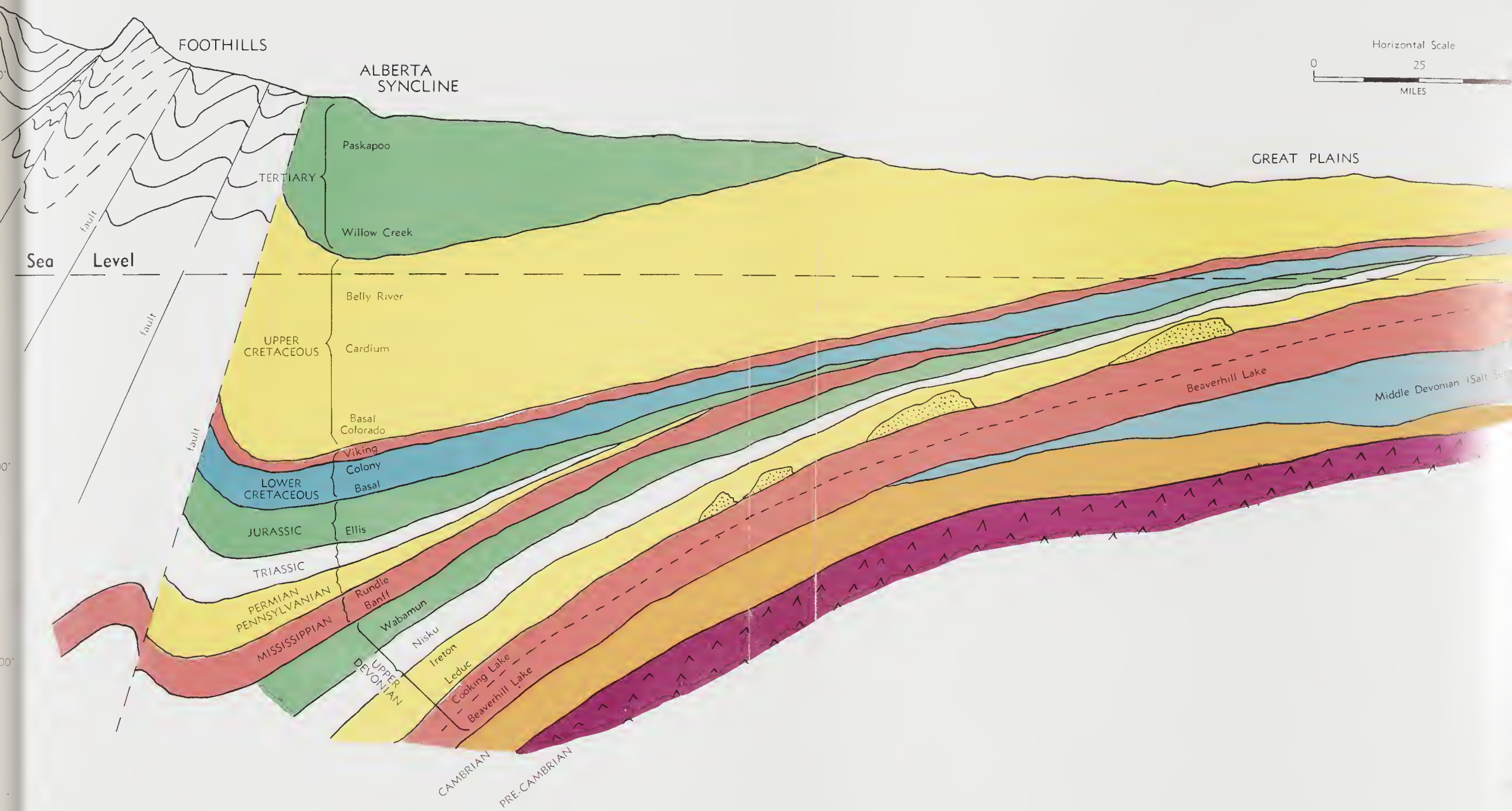
<u>Era and Duration</u>	<u>Period and Duration</u>	<u>Epoch</u>	<u>Geological Events</u>
Cenozoic 55	Quaternary 2	Recent Pleistocene, or Glacial	} Topography determined.
	Tertiary 53	Pliocene Miocene Oligocene Eocene Palaeocene	
	Cretaceous 55	Upper	} Uplift of the Rocky Mountains.
Mesozoic 106		Lower	
	Jurassic 28	Upper Middle Lower	} Oil sands deposited. Coal laid down. Oil and gas formed.
	Triassic 23	Upper Middle Lower	
Palaeozoic 314	Permian 33		
	Carboniferous 74	Pennsylvanian Mississippian	} Oil and Gas formed.
	Devonian 37	Upper	
		Middle Lower	} Salt laid down.
	Silurian 22		
	Ordovician 79	Upper Middle Lower	
	Cambrian 69	Upper Middle Lower	
Proterozoic or pre-Cambrian 1,355			

TOPOGRAPHY OF ALBERTA



XY MOUNTAINS

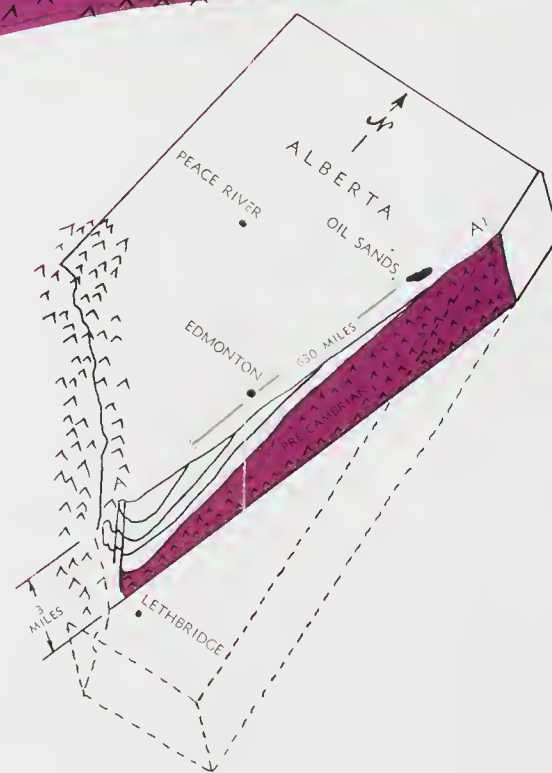
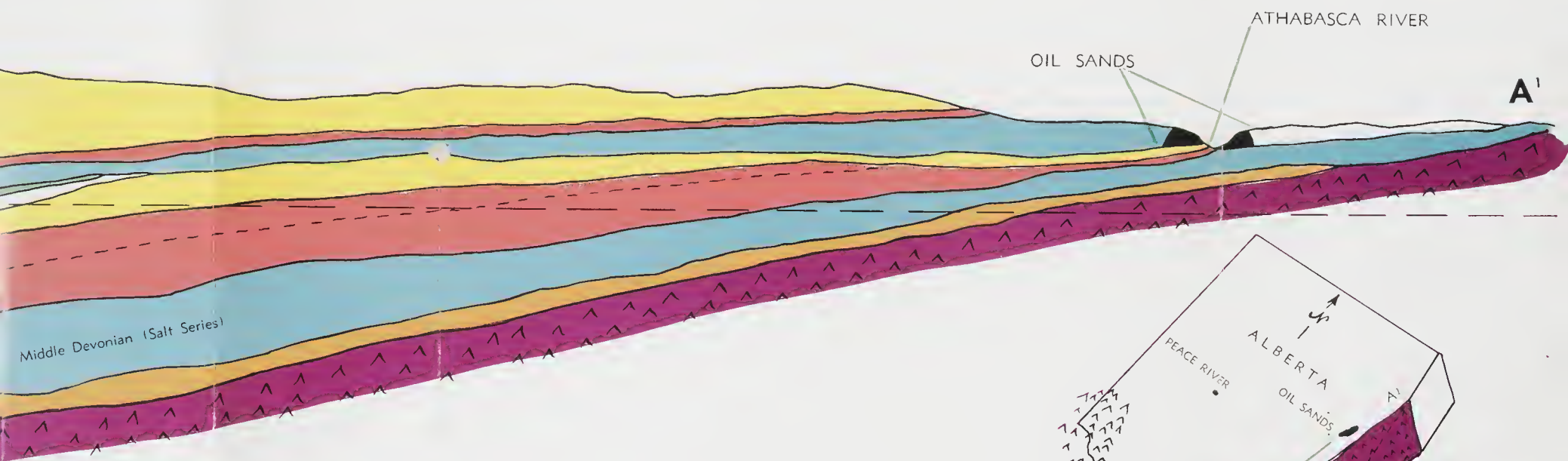
TYPICAL GEOLOGICAL CROSS-SECTION OF AL



SECTION OF ALBERTA

Horizontal Scale
25 50
MILES

Legend
Reefs



Intrusions of igneous rock into the old pre-Cambrian sediments of the Canadian Shield have favoured the deposit of metallic minerals in many parts of the country. Though no such deposits have yet been discovered in Alberta, there are certainly possibilities which may reward further exploration. Deposits found in the Shield near Alberta have considerable importance to the province.

The sediments immediately underlying the surface of most of the plains area of Alberta are Upper and Lower Cretaceous rock of the Mesozoic Era. These are varied sandstones and shales, and con-

tain the famous McMurray oil sands. Coal seams occur in several of the formations, and many have yielded oil and gas. Throughout the plains area the sediments are almost everywhere covered by unconsolidated material—sands, gravels, clays and other soil—of more recent periods.

The rise of the Rockies brought not only Mesozoic, but Palaeozoic and pre-Cambrian rocks to the surface. These are almost exclusively sedimentary rocks, consisting of quartzites, sandstones, shales, dolomites and limestones. Only one small igneous intrusion, the Crowsnest volcanics, is known to exist in the Alberta Rockies.

ECONOMIC GEOLOGY

Alberta is Canada's storehouse of mineral fuels, and an increasingly important source of petroleum and natural gas for North America. Alberta's presently known resources have made Canada second in energy resources in the Western Hemisphere, and have made petroleum the nation's leading mineral product. Oil and gas exploration and production have been responsible for much of Alberta's rapid economic growth in the last decade.

It is natural that attention should focus on these energy resources—including Alberta's ample store of coal, and her still largely-unexploited bituminous sands. These do not, however, exhaust the list of Alberta's economic minerals, nor the possibilities of further discovery, as the latter parts of this section will show.

Petroleum

The years following the discovery of a major oil field at Leduc, Alberta, in 1947, have witnessed a further succession of oil and gas discoveries of great importance. By the end of 1956 nearly 13,000 wells had been drilled in Alberta, and the number of producing oil and gas fields was about one hundred.

Oil had been discovered at Turner Valley, near Calgary, in the early years of the century, but by 1946 known reserves were only 72 million barrels. Then came Leduc, and the discoveries following:

by late 1957, some 3,900 million barrels of oil had been found in Alberta. Remaining reserves, after production, were estimated at 3,112 million barrels.^o It now appears probable that total reserves will eventually prove to be at least 15,000 million barrels, of which an estimated 10,500 million may be discovered by 1975.

Some 213,500 square miles in Alberta—between eighty and ninety per cent of the area of the province are underlain by sedimentary deposits which invite exploration for oil and gas. Nearly all this area is in the plains, with about 12,000 square miles in the foothills.

The Upper and Lower Cretaceous, Mississippian and Upper Devonian formations contain the most widespread oil and gas bearing formations, while some deposits occur also in limited areas of the Jurassic and Triassic. Names, and sequence of the individual formations in which discoveries have been made, are shown schematically on page 27.

The Alberta Syncline, as noted earlier, has played an important part in the creation of oil and gas deposits. On the gently upward-sloping eastern flank of the syncline have been found Pembina, Redwater, Bonnie Glen, Leduc-Woodbend, Wizard Lake, Golden Spike, Fenn-Big Valley—in other words, all the present major fields, as well as several others. Another subsurface geological feature, the Sweetgrass Arch, has yielded a number of smaller

^oIncludes 185 million barrels of condensate.

fields. There are fields—most of which are more noted for gas than for oil—in the foothills. The latter area, with its folded and twisted strata, still offers scope for much further exploration.

Natural Gas

The geology of the natural gas deposits parallels that of the petroleum fields. Gas discoveries have been more numerous, however, and more widespread through the province. Table II lists the eighteen major fields, which contain more than

sixty-three per cent of the total known reserves while the remaining quantity was contained in many smaller fields.

Three of the leading fields are located within thirty miles of Calgary and many of the others are distributed across the southern part of the province as well as in the vicinity of Edmonton. Large reserves found farther north, in the Peace River area, are of importance, although the majority of the discoveries to date in this area has been in the vicinity of the border joining British Columbia.

TABLE II
NATURAL GAS RESERVES OF MAJOR* GAS FIELDS OF ALBERTA

Field	Zones	Estimated Disposable Gas Reserves (Billions of cubic feet)
Pincher Creek	- - Rundle	1,700
Medicine Hat	- - Medicine Hat, Bow Island, Ellis	1,320
Cessford	- - Viking, Basal Colorado, Basal Blairmore	1,109
Westerose South	- - Leduc	1,000
Harmattan-Elkton	- - Mississippian	920
Homeglen-Rimbey	- Leduc	770
Waterton	- - Rundle	700
Calgary	- - Basal Quartz, Mississippian	383
Pembina	- - Belly River, Cardium, Basal Blairmore, Rundle	431
Leduc-Woodbend	- - Viking, Blairmore, Nisku, Leduc	639
Bonnie Glen	- - Leduc	653
Windfall	- - Viking, Rundle, Leduc	323
Viking-Kinsella	- - Viking, Blairmore, Devonian	445
Jumping Pound	- - Rundle	518
Provost	- - Viking	540
Nevis	- - Nisku, Leduc	550
Savanna Creek	- - Rundle	550
Turner Valley	- - Rundle	340
Remaining Fields		8,147

* Major gas fields have been taken as those with over 250 billion cubic feet of disposable gas.
•• As at January 1st, 1958, except for the Calgary Field, estimated in 1957.

ECONOMIC GEOLOGY OF ALBERTA



TABLE OF FORMATIONS—ALBERTA

ERA	PERIOD	SOUTH-CENTRAL MTNS. & FOOTHILLS	SOUTHERN PLAINS	CENTRAL PLAINS	NORTH-CENTRAL MTNS. & FOOTHILLS	NORTHWEST PLAINS	NORTHEAST PLAINS
CENOZOIC	QUATERNARY	RIVER GRAVEL AND SAND, SOIL GLACIAL DEPOSITS—MORAINES, DRIFT, LAKE FILLS, ESKERS, KAMES REWORKED OLIGOCENE CONGLOMERATES					
	TERTIARY	PORCUPINE HILLS WILLOW CREEK	PASKAPOO WILLOW CR.	PASKAPOO	PASKAPOO	PASKAPOO	PASKAPOO
MESOZOIC	UPPER CRETACEOUS	ST MARY RIVER BELL RIVER HIGHWOOD SS.	ST MARY RIVER BELL RIVER MILK RIVER FIRST WHITE SPECKLED SHALE	EDMONTON BELL RIVER LEA PARK FIRST WHITE SPECKLED SHALE	BRAZEAU WAPIABI BIGHORN BLACKSTONE	WAPIABI BIGHORN BLACKSTONE	BELL RIVER BELL RIVER BELL RIVER BELL RIVER
		WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE
		WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE
		WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE
		WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE	WAPIABI BLACKSTONE
	LOWER CRETACEOUS	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY
		BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY
		BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY
		BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY
		BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY	BLAIRMORE DALHOUSIE KOOTENAY
PALEOZOIC	JURASSIC	FERNE GROUP NORDEGG	FERNE GROUP NORDEGG	FERNE GROUP NORDEGG	FERNE GROUP NORDEGG	FERNE GROUP NORDEGG	FERNE GROUP NORDEGG
		FERNE GROUP NORDEGG	FERNE GROUP NORDEGG	FERNE GROUP NORDEGG	FERNE GROUP NORDEGG	FERNE GROUP NORDEGG	FERNE GROUP NORDEGG
	TRIASSIC	SPRAY RIVER WHITEHORSE	SPRAY RIVER WHITEHORSE	SPRAY RIVER WHITEHORSE	SPRAY RIVER WHITEHORSE	SPRAY RIVER WHITEHORSE	SPRAY RIVER WHITEHORSE
		SPRAY RIVER WHITEHORSE	SPRAY RIVER WHITEHORSE	SPRAY RIVER WHITEHORSE	SPRAY RIVER WHITEHORSE	SPRAY RIVER WHITEHORSE	SPRAY RIVER WHITEHORSE
	PERMIAN and/or PENNSYLVANIAN	ROCKY MOUNTAIN TUNNEL MTN.	ROCKY MOUNTAIN TUNNEL MTN.	ROCKY MOUNTAIN TUNNEL MTN.	ROCKY MOUNTAIN TUNNEL MTN.	ROCKY MOUNTAIN TUNNEL MTN.	ROCKY MOUNTAIN TUNNEL MTN.
		ROCKY MOUNTAIN TUNNEL MTN.	ROCKY MOUNTAIN TUNNEL MTN.	ROCKY MOUNTAIN TUNNEL MTN.	ROCKY MOUNTAIN TUNNEL MTN.	ROCKY MOUNTAIN TUNNEL MTN.	ROCKY MOUNTAIN TUNNEL MTN.
	MISSISSIPPIAN	RUNDLE GROUP PEKISKO	RUNDLE GROUP PEKISKO	RUNDLE GROUP PEKISKO	RUNDLE GROUP PEKISKO	RUNDLE GROUP PEKISKO	RUNDLE GROUP PEKISKO
		RUNDLE GROUP PEKISKO	RUNDLE GROUP PEKISKO	RUNDLE GROUP PEKISKO	RUNDLE GROUP PEKISKO	RUNDLE GROUP PEKISKO	RUNDLE GROUP PEKISKO
	DEVONIAN	FAIRHOLME GROUP SOUTHERN	FAIRHOLME GROUP SOUTHERN	FAIRHOLME GROUP SOUTHERN	FAIRHOLME GROUP SOUTHERN	FAIRHOLME GROUP SOUTHERN	FAIRHOLME GROUP SOUTHERN
		FAIRHOLME GROUP SOUTHERN	FAIRHOLME GROUP SOUTHERN	FAIRHOLME GROUP SOUTHERN	FAIRHOLME GROUP SOUTHERN	FAIRHOLME GROUP SOUTHERN	FAIRHOLME GROUP SOUTHERN
PALEOZOIC	SILURIAN	ELK POINT GROUP	ELK POINT GROUP	ELK POINT GROUP	ELK POINT GROUP	ELK POINT GROUP	ELK POINT GROUP
	ORDOVICIAN	ELK POINT GROUP	ELK POINT GROUP	ELK POINT GROUP	ELK POINT GROUP	ELK POINT GROUP	ELK POINT GROUP
	CAMBRIAN	CAMBRIAN B. GRANITE WASH	CAMBRIAN B. GRANITE WASH	CAMBRIAN B. GRANITE WASH	CAMBRIAN B. GRANITE WASH	CAMBRIAN B. GRANITE WASH	CAMBRIAN B. GRANITE WASH
PRE-CAMBRIAN		PRE-CAMBRIAN	PRE-CAMBRIAN	PRE-CAMBRIAN	PRE-CAMBRIAN	PRE-CAMBRIAN	PRE-CAMBRIAN

—LEGEND—

GAS.
OIL
COAL
CORRELATION UNCERTAIN
AGE NOT CONCLUSIVELY ESTABLISHED
FACIES TRANSITION

THE PETROLEUM AND NATURAL GAS CONSERVATION BOARD

CALGARY, ALBERTA

15 JAN. 1957

—NOTE—

No oil and gas Board endorsement is intended for the nomenclature employed in this chart. Unit divisions, thicknesses and area and effects have not been defined to a uniform scale. No attempt is made to show the location of individual formations or to show the extent of individual units. The nomenclature and correlations in this chart are based on the work of the Alberta Geological Survey. The nomenclature and correlations in this chart are based on the work of the Alberta Geological Survey. The nomenclature and correlations in this chart are based on the work of the Alberta Geological Survey.

COAL BEARING FORMATIONS

LEGEND COAL BEARING FORMATIONS Alberta Plains

TERTIARY

- Paleocene
- Ravenscrag Formation

UPPER CRETACEOUS

- Edmonton Formation
- BELLY RIVER SERIES
- Oldman Formation
- BELLY RIVER SERIES
- Foremost Formation

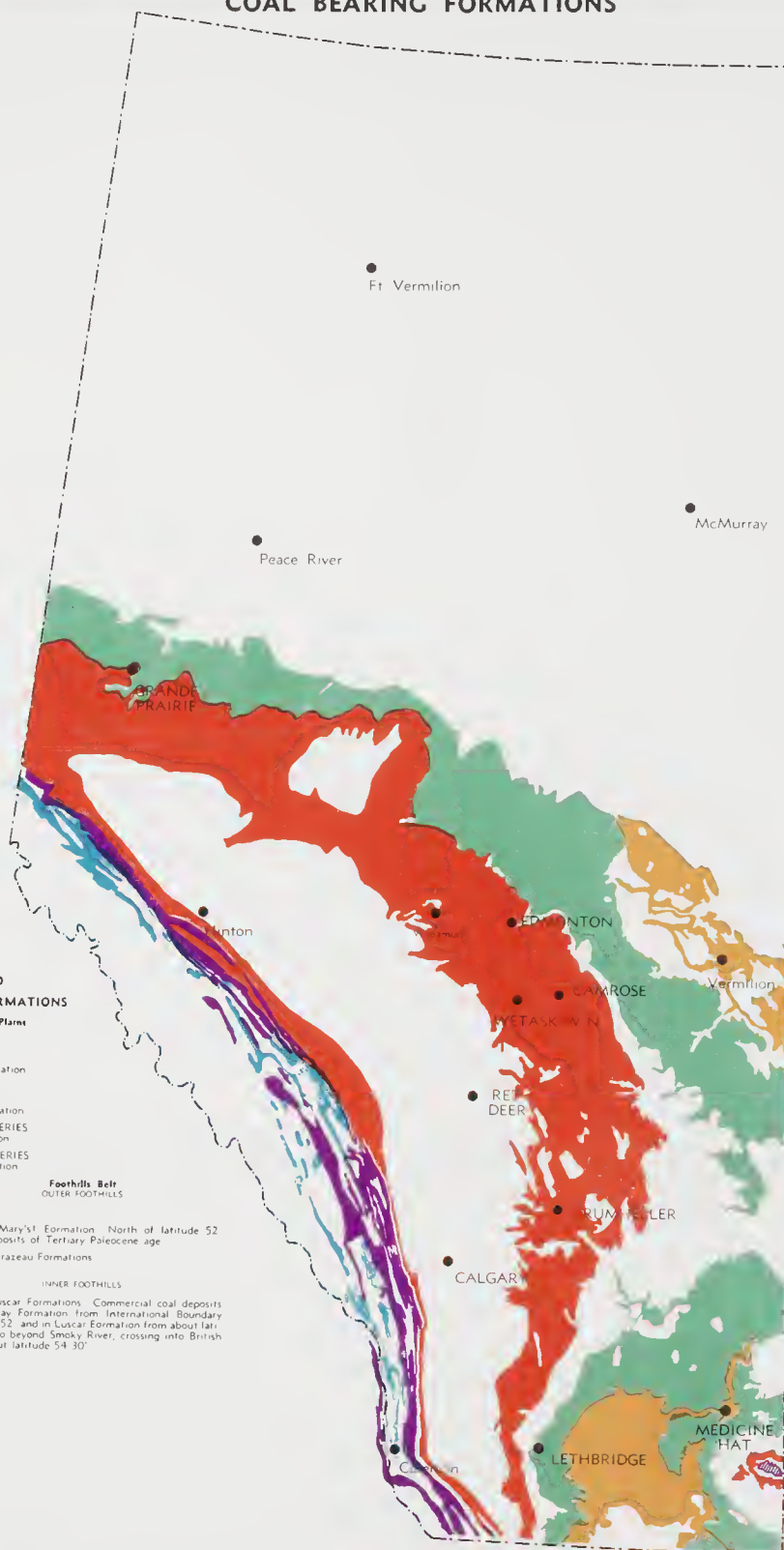
Foothills Belt OUTER FOOTHILLS

UPPER CRETACEOUS

- Edmonton, St. Mary's, Eglar Formation. North of latitude 52 includes coal deposits of Tertiary Paleocene age
- Belly River and Brazeau Formations

LOWER CRETACEOUS

- Kootenay and Lusk formations. Commercial coal deposits occur in Kootenay Formation from International Boundary north to latitude 52, and in Lusk Formation from about latitude 52 north to beyond Smoky River, crossing into British Columbia at about latitude 54 30'



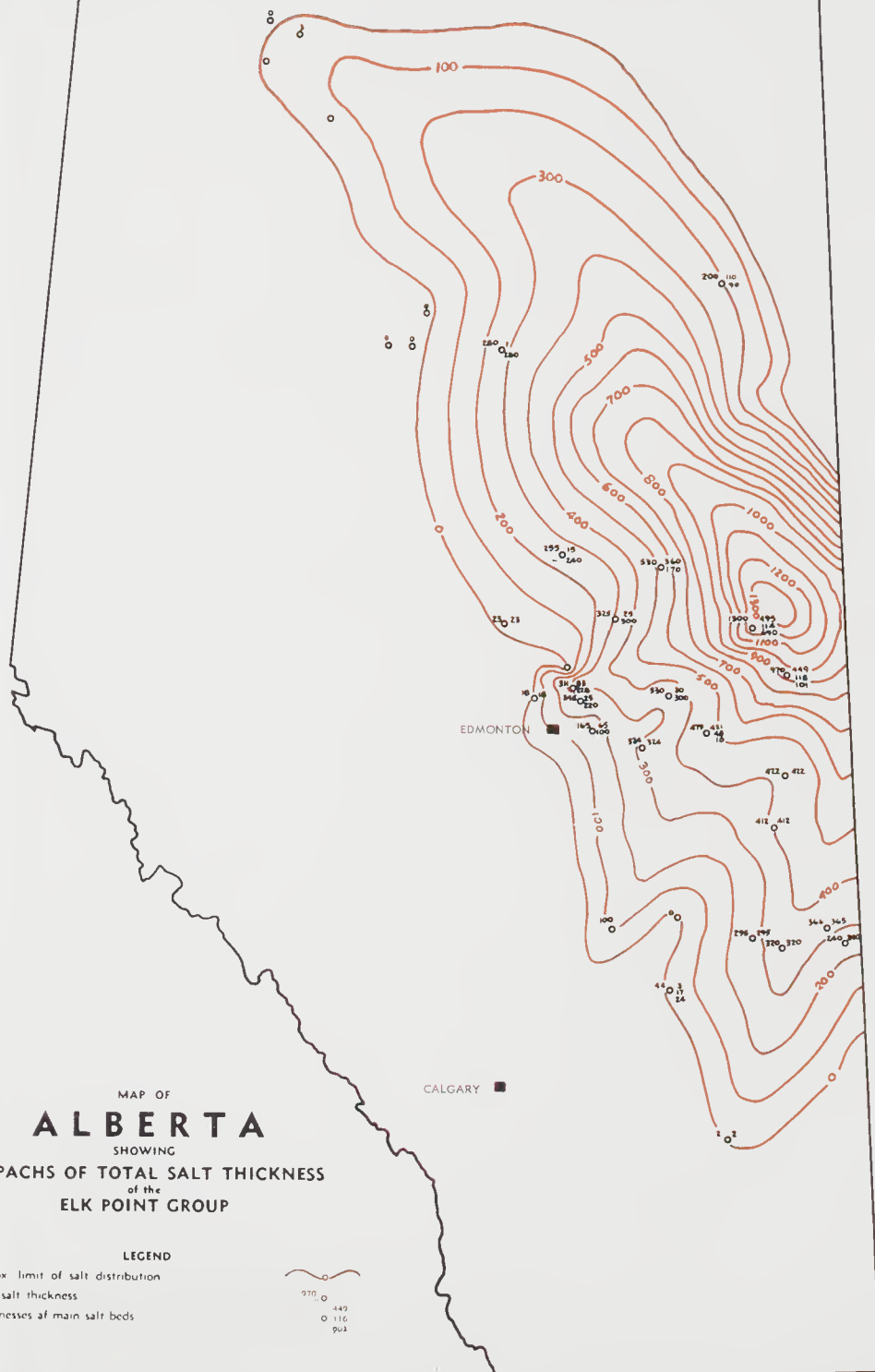
MAP OF
ALBERTA
 SHOWING
 ISOPACHS OF TOTAL SALT THICKNESS
 of the
 ELK POINT GROUP

LEGEND

Approx. limit of salt distribution

Total salt thickness

Thicknesses of main salt beds



At December, 1957, some 24 trillion cubic feet of natural gas had been discovered in Alberta. Subtracting marketed production, disposable natural gas reserves at that time were estimated to be 21 trillion cubic feet. It has been predicted, probably conservatively, that total virgin reserves will reach a total of 52 trillion cubic feet by 1975, and some authorities predict 75 trillion cubic feet by this date.

Athabasca Oil Sands

The famous Athabasca oil sands outcrop for over 30 miles along the Athabasca River in northeastern Alberta. The formation is an oil-impregnated sand averaging about 180 feet in thickness and saturated with a heavy asphaltic oil containing about five per cent sulphur. The known deposits occur over an area of some 2,500 square miles, and some 800 square miles of this area have less than 150 feet of overburden.

An estimate considered to be conservative is that the known 2,500 square miles of formation contain some 150 billion barrels of oil, or many times the probable reserves of oil in the rock strata beneath Alberta's plains and foothills. In comparison, the underground petroleum reserves of the world were estimated in 1954 to be about 137 billion barrels.

The greater part of the sands is at too great depth or averages too low an oil content for immediate commercial exploitation. However, a considerable amount of exploratory work has developed some relatively rich areas. At one location an oil sand area of about four and one-half square miles was found to have an average of 13.6 per cent of bitumen and to contain some 900 million barrels of oil, with a sufficiently light overburden to make open pit mining feasible. Various methods of recovery of the oil from the sands have been proposed, and modern methods of refining yield a satisfactory range of petroleum products.

While commercial utilization of the sands has not yet been achieved, various projects under development promise profitable operation in the relatively near future, and a number of large companies are now active in the field.

Coal

Alberta's coal reserves, estimated on the basis of coal economically mineable by present methods, total some 48 billion tons—nearly half the total coal reserves of Canada. Most of the coal is bituminous, though a small proportion is sub-bituminous and lignite:

Rank of Coal	Reserves
Low volatile bituminous including semi-anthracite	13,132,000
Medium volatile bituminous	15,169,280
High volatile bituminous	11,014,060
Sub-bituminous	8,555,600
Lignite	3,360

Total	47,874,300

Coal-bearing formations underlie most of the southern half of Alberta, occurring in Lower Cretaceous, Upper Cretaceous and Tertiary strata. In the plains, coal measures of Upper Cretaceous age outcrop or come near the surface over wide areas on the east side of the Alberta Syncline. Older deposits of the Lower Cretaceous have been brought to the surface in the foothills by folding and faulting of strata, and Upper Cretaceous measures are also found in the outer foothills. The more recent deposits of Tertiary age are found in smaller areas of both the foothills and the plains.

Sulphur

Although Alberta contains no known mineral deposits of sulphur, it is readily obtained from the hydrogen sulphide contained in sour natural gas. Some gas fields contain very large quantities of this gas. As an example, the Wabamun horizon in the Calgary field contains 34.7 per cent hydrogen sulphide, the Wabamun horizon in the Okotoks field contains 33.2 per cent hydrogen sulphide and the Leduc producing horizon in the Winborne field contains 35 per cent hydrogen sulphide.

Sulphur has been recovered from natural gas in Alberta since 1952, and is now obtained at Jumping Pound, Turner Valley and Pineher Creek.

Large percentages of hydrogen sulphide have been found in the gas of a number of fields from Stettler to Pincher Creek and further sulphur recovery at Okotoks, Savanaa Creek and Calgary fields may be expected in the near future, as an adjunct to natural gas production and purification.

Current recoverable reserves of sulphur from natural gas are estimated at 20 million tons, and these are likely to increase to more than 40 million tons by 1975.

A second large reserve of sulphur in Alberta is contained in the Athabasca oil sands. The bitumen contains about five per cent sulphur and in one square mile studied there was an estimated 1.5 million tons of sulphur. A 20,000 barrel per day bitumen plant would produce about 140 tons per day of sulphur.

Salt

Three large beds of salt underlie a large part of Alberta, occurring in the Elk Point formation, of Middle Devonian age. Of excellent quality, the deposits are extremely low in usual impurities and suitable for any commercial use. The beds occur at depths ranging from 700 feet at Waterways to over 5,000 feet in the south. Covering an area of about 75,000 square miles, they run in a band more than 100 miles wide from the far north to the south, in the eastern half of the province. The beds have a maximum total thickness of 1,300 feet and taper gradually toward the margins of the deposit.

Potash

In Saskatchewan, rich deposits of potash are associated with deposits of salt similar to those in Alberta. The very few analyses performed for potash have not shown comparable potash concentrations in Alberta. A number of areas have thus been eliminated as possible sources of potash, but many areas are yet to be examined.

Limestone and Dolomite

Exposed supplies of limestone and dolomite in Alberta are more than sufficient to meet all foreseeable needs. High-calcium limestone, required for cement manufacture and for hydrated lime, is

plentiful. The deposits, occurring mainly in Cambrian, Devonian and Carboniferous rock, outcrop both in the northeast and the west of the province. The eastern beds are too remote for present development, but quarrying is carried on at several points in the west—principally at Cadomin,shaw and Summit.

These western outcrops are found in the foothills and in the front ranges of the Rockies. They are steeply tilted and are variable in thickness in rock and chemical characteristics. As an ample of reserves, those at Cadomin are estimated to be a minimum of 15 million tons.

Studies of the limestones have been largely confined to the sections of the Rocky Mountains by the railways, and in these areas many high-calcium deposits have been found. Other excellent quarry sites can undoubtedly be developed as they are required.

Sand and Gravel

Sand and gravel are widely distributed in Alberta, coming from two main sources—Tertiary sediments, and Glacial deposits. Tertiary sediments are found in a belt along the western margin of the plains, extending into the foothills, and some upland remnants in the plains. Sands and gravels of glacial origin are more widely distributed, though they are relatively scarce to the east and northeast.

In some areas, particularly near Lethbridge and Red Deer, good commercial deposits known as Saskatchewan gravels occur in a stratum between Tertiary and Glacial deposits. Good gravels are also found in pre-Glacial stream channels, where they have been exposed by erosion—large points west of Edmonton in the Wabamun district.

Sand and gravel supplies are in practice limited, although the better grades are becoming less available near major centres.

Silica Sand

A large deposit of silica sand has been discovered in formations of the lower Cretaceous, outcropping in the river bank near the town of Peace River.

of the highest grade deposits known in Canada, it is most suitable for use in glass and ceramics manufacture. The deposit is believed to exceed one million tons in extent. A further deposit has been discovered in the Pipestone Creek area, about 22 miles north of Lake Louise station, and the Athabasca oil sands are mainly silica.

The silica content of the Peace River sand in the original state is about 98.5 per cent and beneficiation reduces the iron content to less than half of the original amount, which varies from 0.1 to 0.2 per cent. Analyses of the Pipestone River silica sand show the silica content varying from 98.4 to 98.7 per cent and the iron content from 0.2 to 0.5 per cent.

The sand of the Athabasca oil sands consists essentially of silica, with mica as the chief impurity. Analysis of this sand after beneficiation shows the silica content varying from 99.14 to 99.46 per cent, and iron content ranging from 0.07 to 0.085 per cent.

Clay and Shale

Alberta clays are principally Claciel and post-glacial deposits. They are suitable for the manufacture of cement, and of brick, tile and similar products, but are not suitable for ceramic use. Deposits of kaolins, fireclays and stoneware clays are being investigated in the Whitemud formation of the Cypress Hills in the southeast of the province.

The shales are found in older sediments. Freshwater shales of Lower Cretaceous age outcropping in the foothills, and of Upper Cretaceous and Tertiary age in the plains, are suitable for brick, tile, and the manufacture of lightweight aggregate. Marine shales of Jurassic, Lower and Upper Cretaceous age may also prove to be valuable for cement, rock wool and lightweight aggregate industries. Palaeozoic shale and limestone found in the foothills has been used in rock wool manufacture.

Bentonite

Many occurrences of both swelling and non-swelling bentonite have been found in southern and central Alberta, but few of these have to date

proved sufficient in quantity or of a suitable quality for commercial development.

Most of the deposits occur in Upper Cretaceous sediments. Thin beds of fair quality swelling bentonite are mined with coal in the vicinity of Drumheller. A non-swelling bentonite deposit in the McLeod River district, southwest of Edson, has proved suitable for use in cosmetics manufacture. There are other occurrences south of Lethbridge, south of Camrose, and in beds up to four feet thick south of Medicine Hat. Several thick beds of relatively pure non-swelling bentonite have been discovered northwest of Nordegg, in the foothills, but have not as yet been fully tested for quality. Probably the most promising deposits are near Busby, 35 miles northwest of Edmonton.

While the bentonites of the Edmonton formation are somewhat silty, lenses of fairly pure bentonite have been found. It is therefore possible that further prospecting for bentonite in the Edmonton formation would lead to new discoveries of commercial importance.

Gypsum

Gypsum has been found in commercial quantities in two widely separated locations, but neither deposit is utilized because of the mineral restrictions applied in National Parks of Canada. Further exploration may well establish the existence of large deposits in areas available for development, since some evidence of such deposits already exists.

Within and north of Jasper National Park, near the headwaters of Mowich Creek, there are deposits of pure gypsum aggregating 200 feet in thickness, with individual beds up to 15 feet thick, in Triassic strata. Another major deposit lies along the lower Peace River in Wood Buffalo National Park, in Upper Silurian strata. Here a maximum thickness of 50 feet of gypsum is exposed and the deposit is estimated to contain over two million tons of the mineral, lying under a thin overburden.

Gypsum found near the headwaters of Mowich Creek ranges from 82.4 to 95.6 per cent in purity. The Peace River gypsum deposit, while it is a considerable distance from Edmonton, is accessible by rail and water transportation; should development within the park be made possible this deposit might well become of economic interest in the future.

Iron Ore

Iron ore has been discovered at two places in Alberta. One deposit, near the town of Burmis in the Crowsnest Pass, consists of three iron-bearing, black, magnetic sands, of Upper Cretaceous age, interbedded with a series of soft, rather coarse sandstones. Beds up to eight feet in thickness have been traced over a distance of eight miles. The average iron content is 40 per cent, and there is a five per cent content of titanium dioxide.

The other deposit, discovered in 1953 as a result of petroleum drilling, is reported to cover an area of about 43 square miles, averages some ten feet thick, and may include an iron ore reserve of about one billion tons. The ore is mainly oolitic hydrous iron oxide, ranging from 22 per cent to 40 per cent iron content, which, however, does not constitute a high grade deposit. It is located near the Notikewin River, north of Hines Creek in the Peace River country. Prospecting is under way in the Pincher Creek, Blainmore and Notikewin River areas.

Other Minerals

Sodium sulphate deposits are found in some lakes in the eastern part of Alberta. Small quantities have been utilized, but the major commercial source is in neighbouring Saskatchewan. The sodium sulphate lakes, some of which contain a permanent bed of crystallized sodium sulphate, occur in undrained depressions left after retreat of the ice in the Glacial Epoch.

Marl deposits of 50 per cent to 90 per cent calcium carbonate exist at a number of locations, especially in the St. Albert and Big Lake areas near Edmonton. Marl may be used as a substitute for limestone for some purposes.

A good grade of talc is located in Banff National Park, occurring as pockets and lenses in Middle Cambrian magnesian limestones.

Volcanic dust or pumicite, a natural glass or silicate, occurs in Alberta in the Lower Cretaceous Crowsnest volcanics, and a deposit west of Nanton is under investigation.

Small amounts of placer gold are obtained from the sands and gravels of the North Saskatchewan River below Edmonton and in the Red Deer River valley.

Phosphatic rock has been found in the Alberta Rockies in the Lower Jurassic and in Triassic strata. The deposits found, to date, have not warranted commercial development.

There are evidences of lead-zinc ores in the upper Oldman River valley.

Other Deposits of Direct Significance to Alberta

Certain mineral areas outside the province, in the Northwest Territories, northwest Saskatchewan and the Peace River area of British Columbia, are important to Alberta. Their utilization largely depends on transportation facilities originating within the province, and their development frequently utilizes Alberta labour and services.

The District of Mackenzie has an established mining area at Port Radium, on Great Bear Lake (ores of uranium, radium, silver and cobalt). It also has the gold mines of the Yellowknife district on Great Slave Lake. The other mineralized areas contain these minerals and also ores of copper, lead, zinc, tungsten, iron, columbium, tantalum, beryllium, lithium and zirconium. The source rocks of these minerals are the pre-Cambrian rocks exposed in the Canadian Shield, or in extensions of the Shield beneath the sedimentary area of the Mackenzie Valley. Minerals of sedimentary origin, such as coal and oil, have also been discovered in the Mackenzie District. The Norman Wells field produced oil during the last world war and now supplies the Radium and Goldfields districts, besides meeting local needs. Exploration for metallic minerals has been largely confined to the area between Great Slave and Great Bear Lakes, and to the north as far as Coronation Gulf and east to Yellowknife.

Lead and zinc replacement deposits occur in dolomite and limestone beds of Middle Devonian age at Pine Point on the south side of Great Slave Lake. This area, which may receive rail service, could become a major producer with indicated reserves reported to be more than 60 million tons. An estimate of the composition of 4.2 million tons of this ore revealed 7.1 per cent zinc, 2.9 per cent lead, 1.1 per cent copper, and some silver. As much of the ore may be open-pit mined, and since it is easy to refine this could prove a very low cost operation.

In northwestern Saskatchewan uranium is found in the Canadian Shield and extensively mined in the Beaverlodge area north of Lake Athabasca. Active mineral exploration has been undertaken in a zone extending from the north shore of Lake Athabasca, through Alberta and into the Northwest Territories, northeast of Fort Smith.

The southeastern part of British Columbia, along the Rocky Mountain Trench, is of growing significance to developments in Alberta. The lead-zinc operations at Kimberley yield considerable quantities of iron tailings which may be available for local iron and steel production. There is a large deposit of phosphatic rock in the Fernie district. Gypsum deposits of up to six million tons are located in the Lake Windermere area and some of

this gypsum, which varies widely in quality, is shipped to the States of Washington and Idaho, as well as to British Columbia and Alberta. Other gypsum deposits have been found at Canal Flats. Barytes is obtained from the Brisco and Parson areas along the upper Columbia River, and is processed at Lethbridge, Alberta, for use as fillers in drilling muds, and in paints, etc. The size of market, as determined by freight rates, is a major consideration in the development of these reserves. The Peace River area of British Columbia, like its extension in Alberta, is a growing natural gas and oil centre. Despite the expected completions of the Pacific Great Eastern Railway, and the gas line from the Peace River area to Vancouver, this district of northeast British Columbia is still closely tied to the Alberta economy.

WATER RESOURCES

For the majority of industrial processes, water—often in very large quantities—is an essential process material. The Province of Alberta has recognized this, providing in law that proposed water diversions shall be considered to have the following order of priority: domestic; municipal; industrial; irrigation; water power; and other uses.

Alberta is not a region of many large rivers. Study allows the conclusion, however, that in absolute terms and for the province as a whole, there will be no problem of water shortage in the foreseeable future.

Certain locations in the eastern part of the province—dependent on water supplies from shallow wells—would certainly prove unsatisfactory locations for major industrial water users or large urban populations. But locations for industrial plants using large amounts of water may readily be found—at or near the larger population centres—along the major streams, or at certain favourable ground water sites.

Water Sources and Drainage Systems

The most important rivers of Alberta rise in the Western mountains and bring water not only to the province, but also to Saskatchewan and Manitoba. Other water sources, more limited in extent, are found in lakes and in ground water from river-de-

posited silts, glacial deposits, pre-glacial river valleys, and underlying bedrock.

The general drainage pattern of Alberta is a fairly simple one, with the main rivers flowing from the slopes of the Rockies, through the foothills to the plains, then following the slope of the land toward the northeast. In the relatively flat plains there are many local exceptions to the general direction of flow, as the rivers twist and bend.

There are five major drainage areas in the province. The Mackenzie River system drains into the Western Arctic. The Beaver, North Saskatchewan and South Saskatchewan Rivers join systems which drain into Hudson Bay, and a small area in the south forms part of the Mississippi River system. More than 80 per cent of population is concentrated in the areas drained by the North and South Saskatchewan Rivers. There are also two significant areas of interior drainage, and many minor watersheds.

Since the level of population across the plains is ultimately governed by availability of water, headwaters of the main rivers require protection and control. This necessity has been underscored by some evidence of shrinkage at the margins of glaciers, and for the past decade the Eastern Rockies Forest Conservation Board has regulated a large area in the Rockies and foothills. It engages in conservation activities mainly designed to maintain the flow of the South Saskatchewan River.

Stream Flow

The major streams of the province differ greatly in their volumes of flow, and for individual streams the seasonal pattern of flow is very marked. Two of the rivers most important to industry, the North and South Saskatchewan, have similar average annual flows of about six million acre-feet at the eastern boundary of Alberta. These streams, and the others rising in the eastern slopes of the Rockies, may have 60 to 70 per cent of their total annual flow in the period from May 15th to September 1st. Flows are lowest in January and February, when they vary from less than one-twentieth to about one-ninth of the maximum monthly flow. In addition to this seasonal variability, the annual flows of rivers vary markedly. Table III gives more specific data for five major rivers.

Ice, Thaw, and Flooding

In a province where inland water traffic is of restricted importance, ice conditions lose much of the significance they hold for other parts of Canada. Local transportation in rural areas is to some extent disrupted by ice formation and break-up at ferry crossings. On the other hand, ice conditions in the north enable travel by tractor-trains and trucks over areas of muskeg which are virtually impassable at other times of the year.

Ice on the Mackenzie River system closes river traffic for more than six months of the year at Waterways, and nearly seven months at Fort Smith, just north of the province. Rivers in the south are frozen for some five months, usually from mid-November to mid-April, though the faster-flowing streams are rarely frozen for this long.

What floods occur in Alberta are often caused by water backing up from ice jams. Apart from occasional damage to low-lying farm land, the incidence of flood damage to property is localized in a very few sections. Occasional flash floods from streams, caused by rapid snow melt, do occur, but damage resulting from all floods is lower in Alberta than in most parts of North America.

Water Quality

The range of permissible water qualities varies considerably, industry by industry, and according

to the purpose for which water is used within individual plants. Desirable general limits have been suggested as 100 to 150 parts per million total hardness. By this standard, the hardness of untreated river water at major Alberta centres is not unduly high in summer months, but in winter runs above generally desirable levels. Desirable maximum limits for iron and manganese (0.3 p.p.m.), total solids (300 p.p.m.), chloride (50 p.p.m.), sulphate (250 p.p.m.), fluoride (1.5 p.p.m.), and nitrate (1.0 p.p.m.) are usually met by surface waters.

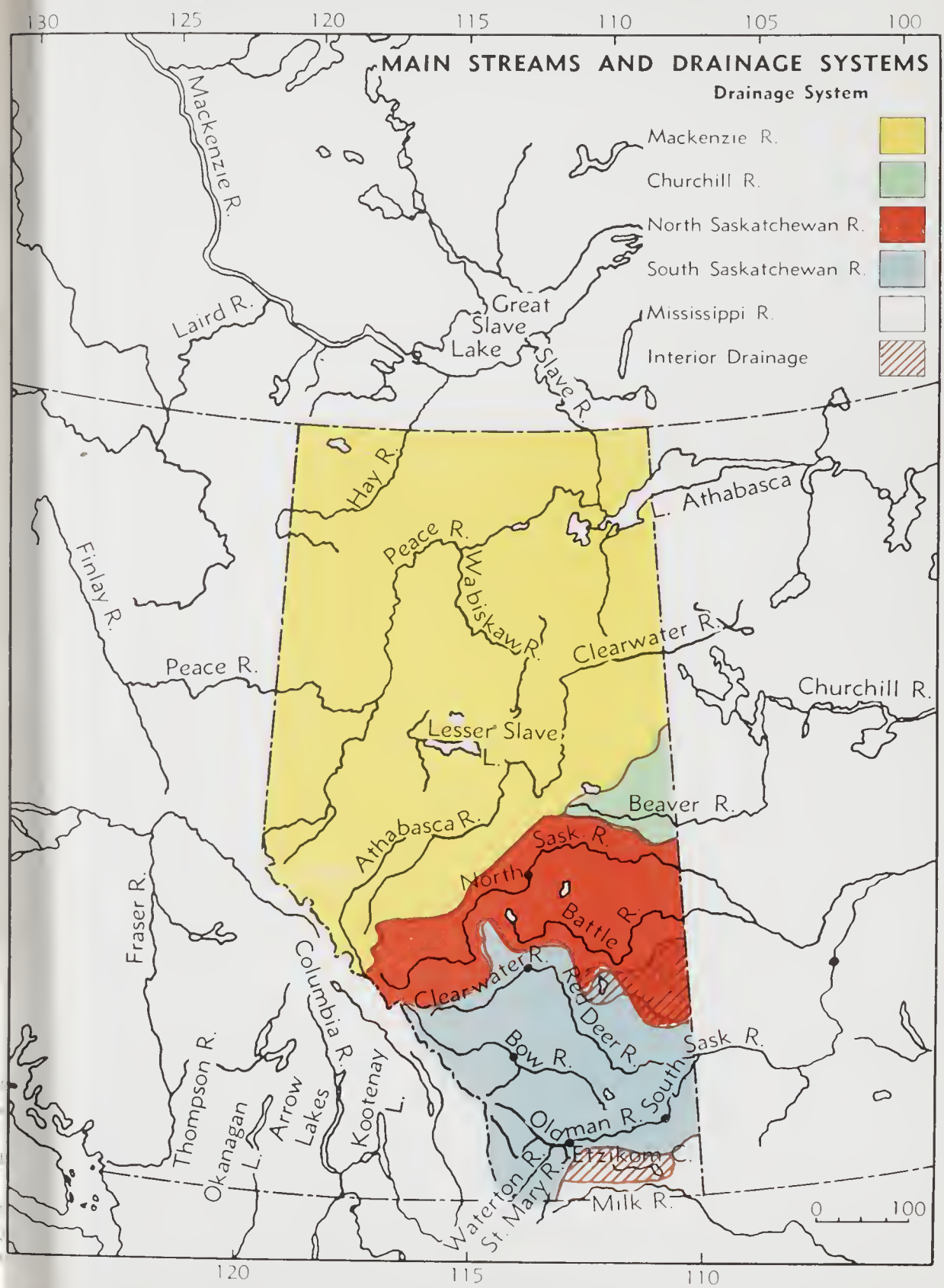
A majority of the streams of the Mackenzie River system, rising in the Rocky Mountains, have a plentiful supply of water which is not excessively mineralized. Water flowing from the Columbia ice fields has a total hardness of 60 to 80 p.p.m. and the Athabasca River at Fort McMurray has a total hardness of only about 110 p.p.m. The North Saskatchewan River system, however, normally supplies hard to very hard water. At Edmonton the typical carbonate hardness of the untreated water averages 98 p.p.m. in the summer and 142 p.p.m. in the winter. Total hardness averages 138 p.p.m. in summer and 228 p.p.m. in winter. The Edmonton water treatment plant reduces average hardness through the year to 35 p.p.m. carbonate and 65 p.p.m. total.

Water of the South Saskatchewan River is similar to that of the North Saskatchewan, though generally less turbid. At Medicine Hat total hardness varies from a typical 120 p.p.m. in the summer to 240 p.p.m. in winter. Calgary industries use the Bow River and wells as water sources; an analysis of Bow River water shows carbonate hardness of 161 p.p.m. and total hardness of 194 p.p.m. An analysis of well water at Calgary gave total solids as 240 p.p.m. and total hardness as 160 p.p.m.

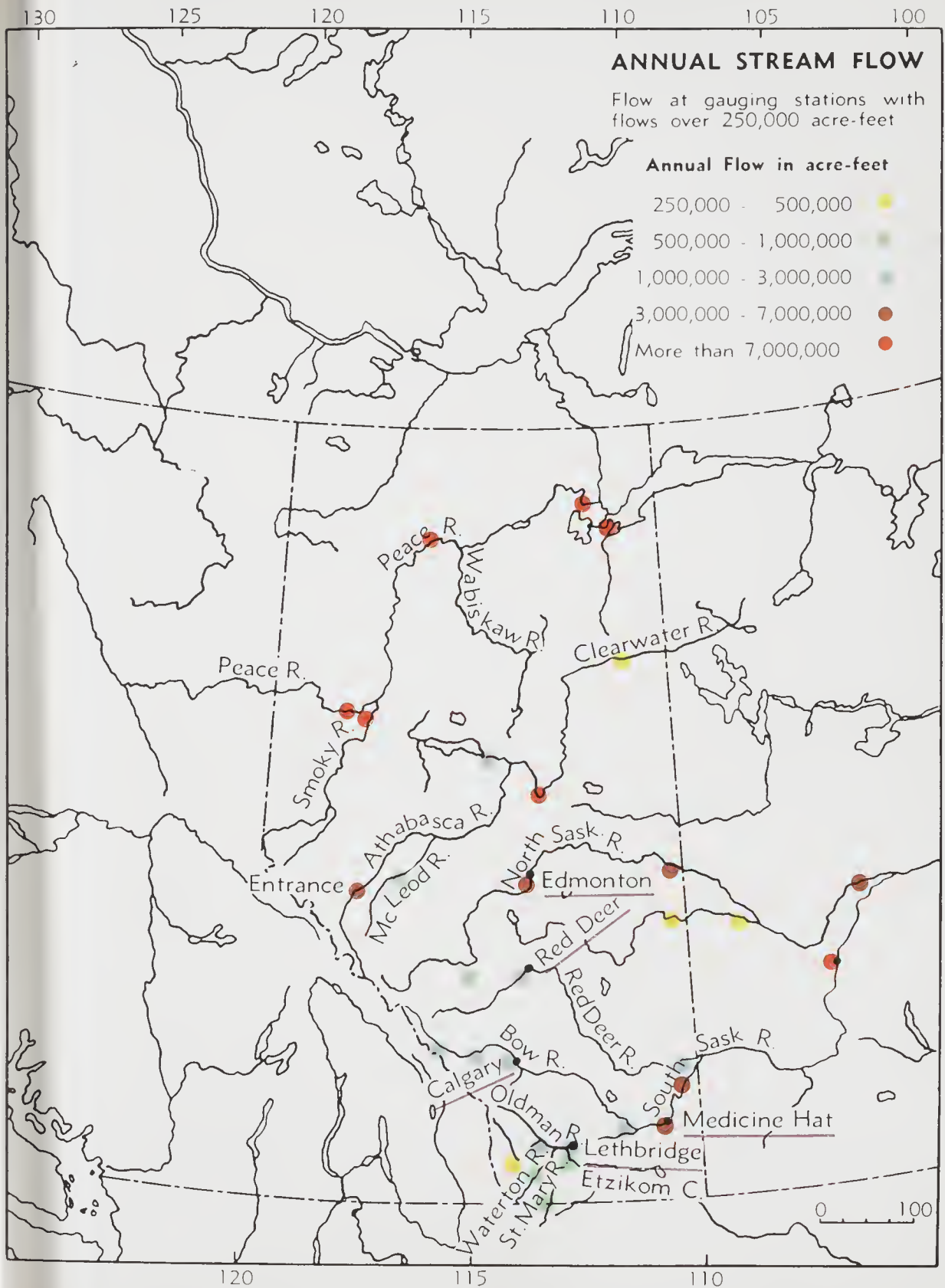
Water and Agriculture

In the south and east of Alberta, the farmer practises water conservation. Occasionally there are problems of drought, but there is normally a sufficiency of ground water for farm use. Methods for conserving precipitation in the soil are well known to Alberta farmers and in general efficiently practised. Though the climate in the main agricultural areas is classed as semi-arid or sub-humid, farming has adjusted to this situation.

WATER RESOURCES OF ALBERTA

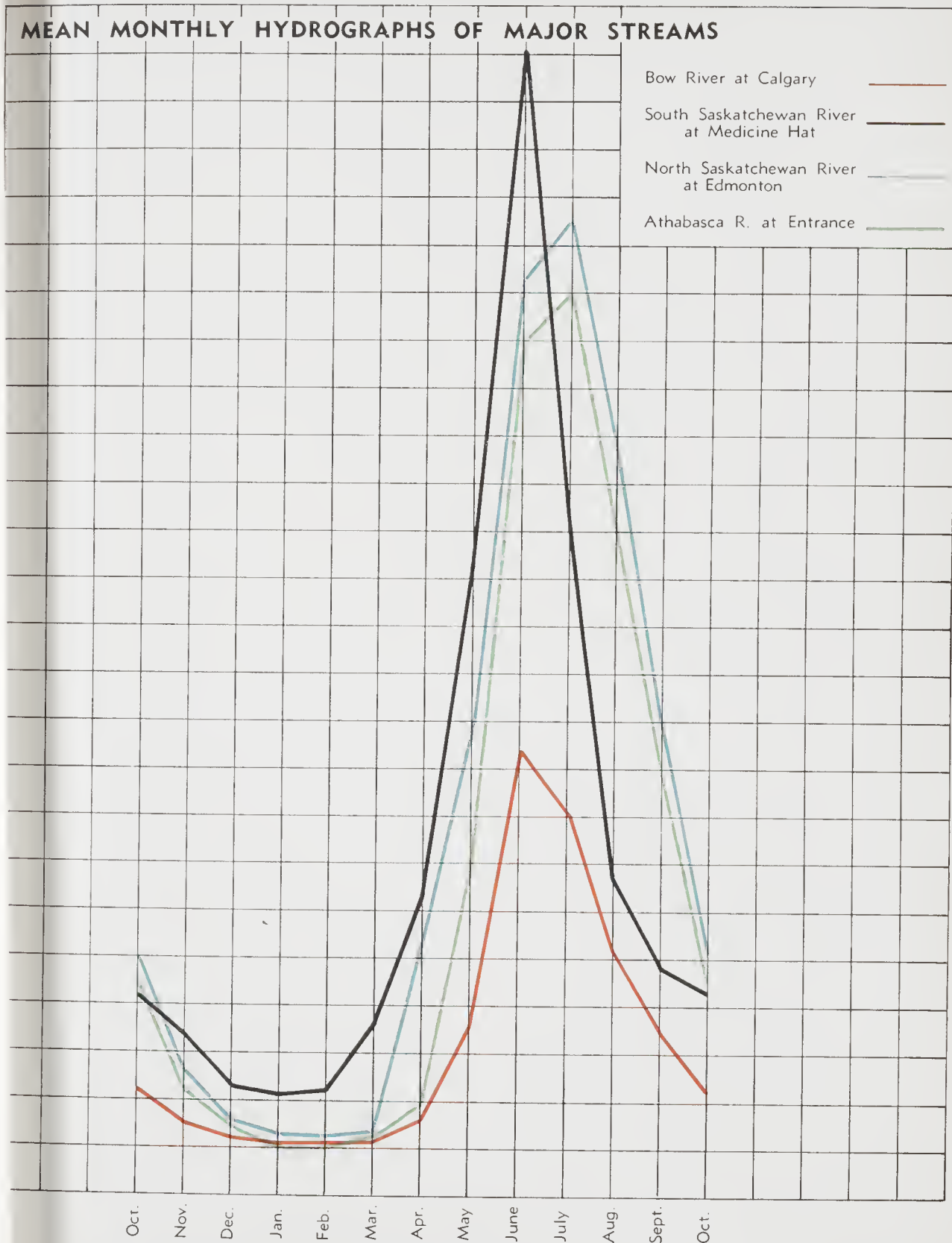


WATER RESOURCES OF ALBERTA

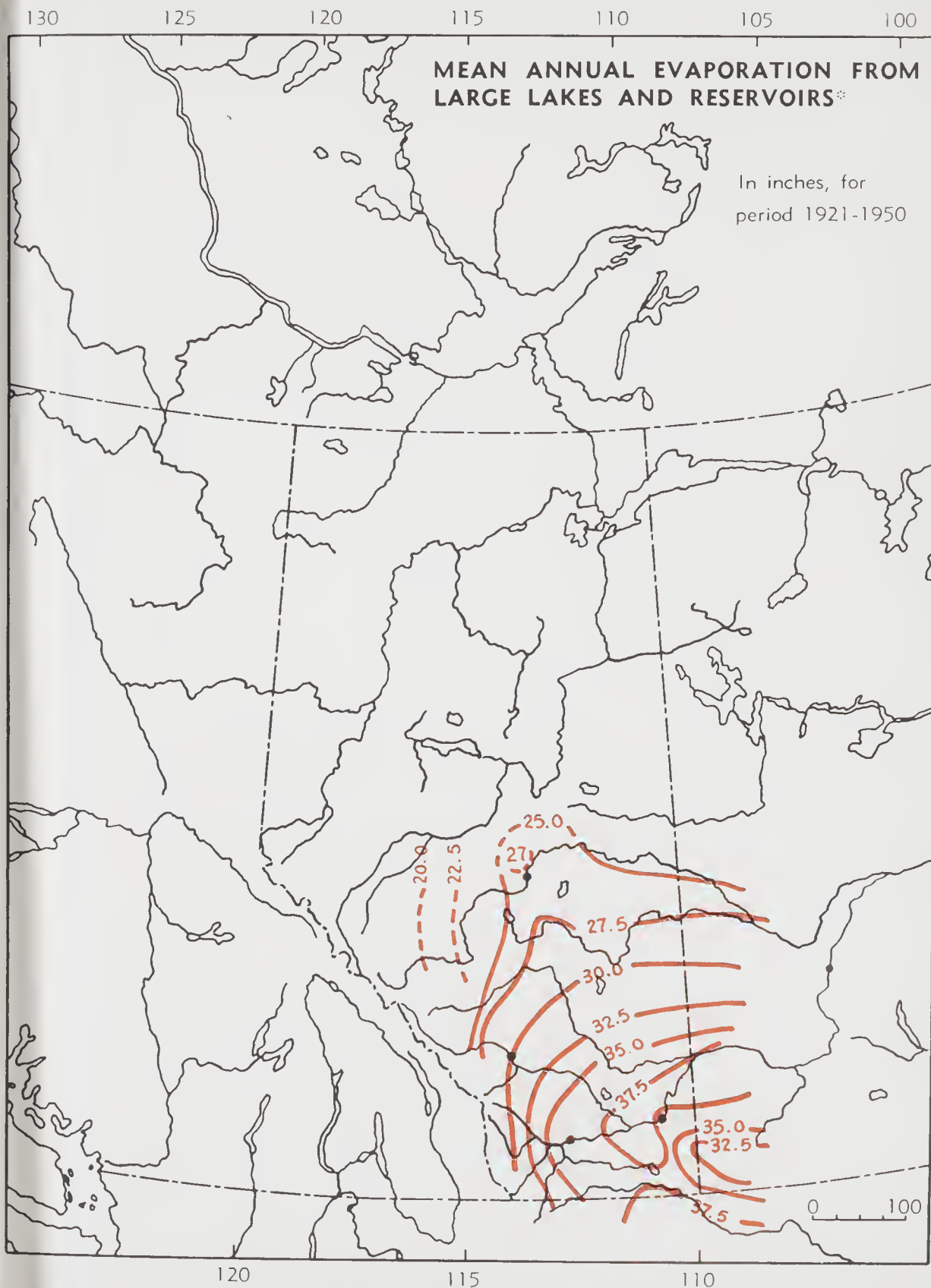


WATER RESOURCES OF ALBERTA

MEAN MONTHLY HYDROGRAPHS OF MAJOR STREAMS



WATER RESOURCES OF ALBERTA



Source: Evaporation from Lakes and Reservoirs on the Canadian Prairies (see Bibliography).

**MAXIMUM, MINIMUM AND MEAN DAILY RIVER FLOWS FOR ANNUAL PERIODS
OCTOBER 1st — SEPTEMBER 30th, 1947-1956**

(Daily flow in cubic feet per second)

Location	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
South Saskatchewan River	Maximum	36,820	90,230	20,260	38,610	59,450	37,910	144,300	38,500	34,990
at	Minimum	2,220	542	214	448	1,060	2,690	1,230	1,610	1,330
Medicine Hat	Mean	8,450	13,020	4,010	6,630	13,220	10,400	11,490	9,105	8,221
Bow River	Maximum	13,160	19,730	7,080	14,820	—	14,400	18,080	13,720	12,860
at	Minimum	930	648	500	301	—	1,590	966	232	760
Calgary	Mean	3,470	3,980	2,360	2,490	—	5,548	5,406	4,055	3,419
Red Deer River	Maximum	18,980	24,120	2,630	8,180	13,300	37,900	21,570	42,620	12,000
at	Minimum	306	312	255	136	165	430	200	220	248
Red Deer	Mean	1,970	2,940	775	949	1,880	2,635	2,280	3,321	2,301
North Saskatchewan River	Maximum	28,600	65,440	32,630	50,330	39,020	109,700	44,900	106,600	30,380
at	Minimum	602	1,140	730	430	624	1,030	652	833	1,040
Edmonton	Mean	7,260	11,260	5,170	6,470	7,420	9,440	8,659	12,170	7,814
Athabasca River	Maximum	70,460	128,800	36,260	55,270	63,410	85,690	64,500	192,300	78,850
at	Minimum	8,630	8,800	5,210	4,730	8,630	2,390	1,490	2,300	1,960
Athabasca	Mean	24,020	39,870	16,010	20,280	26,730	14,240	16,020	24,850	16,560

In certain areas, irrigation offers an alternative to dry farming. Alberta contains nearly all the irrigated land in Canada. More than 10 million acre-feet of water per year is available for irrigation, and the potential irrigable area has been

estimated at some 1.9 million acres. With completion of current projects on the St. Mary and M. Rivers and the Bow River, about 1.3 million acres of this total will come under irrigation.

SOILS

Soils, primarily of interest to the farmer and perhaps the forester, are discussed in Chapter IV under the heading of Agriculture. In this chapter we make only a few general comments before discussing the significance of Alberta soils to the construction industry.

It is over-simplification to describe soils as good or bad, but if the major soil characteristics (depth, structure, texture and composition) are considered, then Alberta's share of good soils compares favourably with that of any other province of Canada.

The major soil groups occur in a series of fairly distinctive belts that may be crossed in sequence, proceeding from the southeast to the northwest. The Brown Soil zone occupies about 12.5 million acres, or 7.9 per cent of the total land area, the Dark Brown Soils about 8.5 million acres (5.3 per cent), the Thin Black Soils cover 7.5 million acres (4.7 per cent), the Black Soils cover about 7.5 million acres (4.7 per cent), the Degraded Black Soils about 9.5 million acres (6 per cent), and the surveyed Grey Wooded Soils extend over some 24 million acres or about 15.1 per cent of Alberta's land area. Soil surveys of the remainder of the province have not yet been reported, but the area probably consists of Grey Wooded Soils with a small area of Podsol Soils on the Shield in the northeast.

All the soils mentioned are arable, though some lie in relatively arid regions. Of the soils, the Black are the most fertile, and in fact are among the most fertile in the world.

Soils and Construction

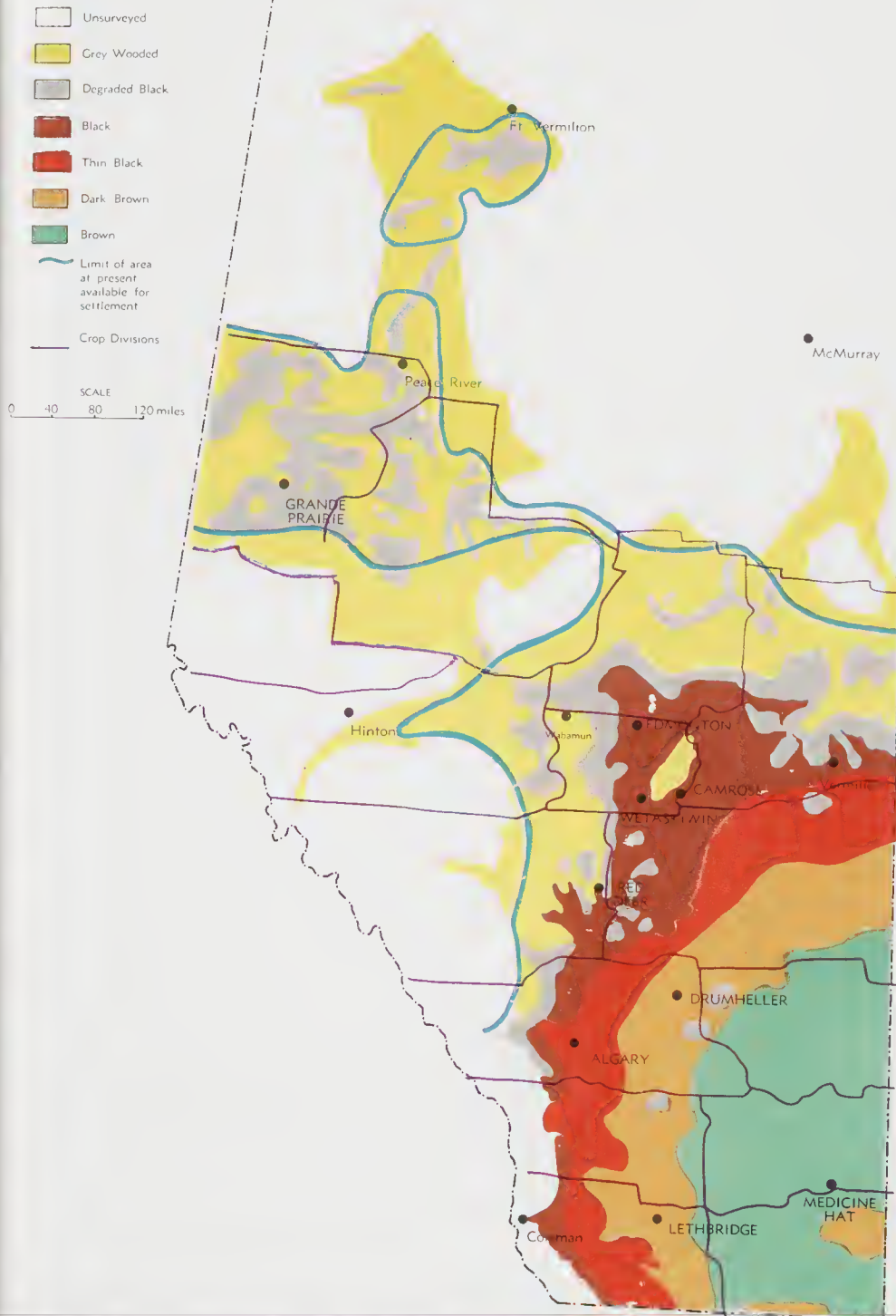
Permafrost, the main handicap to construction in northern Canada, is virtually absent from Alberta. Frost penetration in soils, however, is significant in

Alberta as in other areas of Canada, and can range from 30 inches to over 90 inches in the main settled area, so that frost heaving may be encountered. Clay soils are particularly sensitive to changes in moisture conditions, swelling in periods of increased moisture and shrinking and cracking in dry periods.

In certain soils where water can move freely by capillary action, formation of solid lenses of ice (ice segregation) may occur as the frost line drops during the winter. In the spring, when this ice melts, there is an excess of water in the soil and there may develop what is commonly known as a "frost boil" on highways or runways. Clean coarse sands and gravels are too open, and most clay soils too compact, to permit the capillary movement of water which leads to ice segregation. This action is most severe in the more permeable soils which contain silt, such as dirty sands or gravels, and in a clay it requires a slowly dropping frost line. Frost boils may be prevented by replacing the soil which is susceptible to ice segregation by soil which is not susceptible; by drainage, or by addition of special chemicals, such as certain waste sulphite liquor products.

Silts, hard and stable when dry, may prove highly unstable when moist, but the dangerous "varved" clays have a very limited distribution in Alberta compared with other provinces. Glacial till, which covers much of the surface of Alberta, forms a satisfactory foundation belt and provides useful construction material, especially for the earthen dams common in Alberta. In the north the scattered areas of muskeg prove a handicap to construction and usually require clearing before foundations for buildings or routes can be built. Concrete in contact with soils of high alkali content may require to be made with alkali-resistant cement.

SOILS OF ALBERTA



NATURAL VEGETATION

Coming to Western Canada, the settlers found the vast expanse of rolling grassland in great contrast to the wooded landscape of their eastern homes. They gave the Prairie Provinces their name—a misleading name, for by far the larger part of the three provinces lies outside the grasslands. In Alberta, two-thirds of the land is forested.

Two different grassland divisions, the short-grass prairie and the mixed-grass prairie, are recognized in Alberta. The transition zone between prairie and forest is known as parkland, and there are three forest types: mixed-wood, northern coniferous, and subalpine. At elevations above the timber line is found alpine tundra. The differences between the two types of grassland and between the grasslands and forests result largely from differences in moisture conditions, while the distinctive forest types largely reflect temperature differences.

The grasslands and parkland, being reserved principally for agriculture, may be held for discussion under that topic. The forests, being of importance to the lumbering, wood-using and construction industries, will be considered here.

The mixed-wood forest—the largest vegetation area in the province—contains approximately equal amounts of deciduous and coniferous trees. Aspen (white poplar) and balsam (black poplar) are the predominant hardwoods, and white spruce the principal softwood. Other softwood species are Engelmann spruce, black spruce, lodgepole pine and jack pine. In the northern coniferous forest, white spruce is again the major species, associated with black spruce, balsam fir, tamarack, jack pine and white birch. The subalpine forest is characterized by Douglas fir, lodgepole pine, Engelmann spruce and alpine fir.

The total forested land area in Alberta, including National Parks and the Rocky Mountains Forest Reserve, amounts to 105.7 million acres or 10.2 per

cent of the total forested area of Canada. The non-forested land in Alberta has an area of 53.5 million acres.

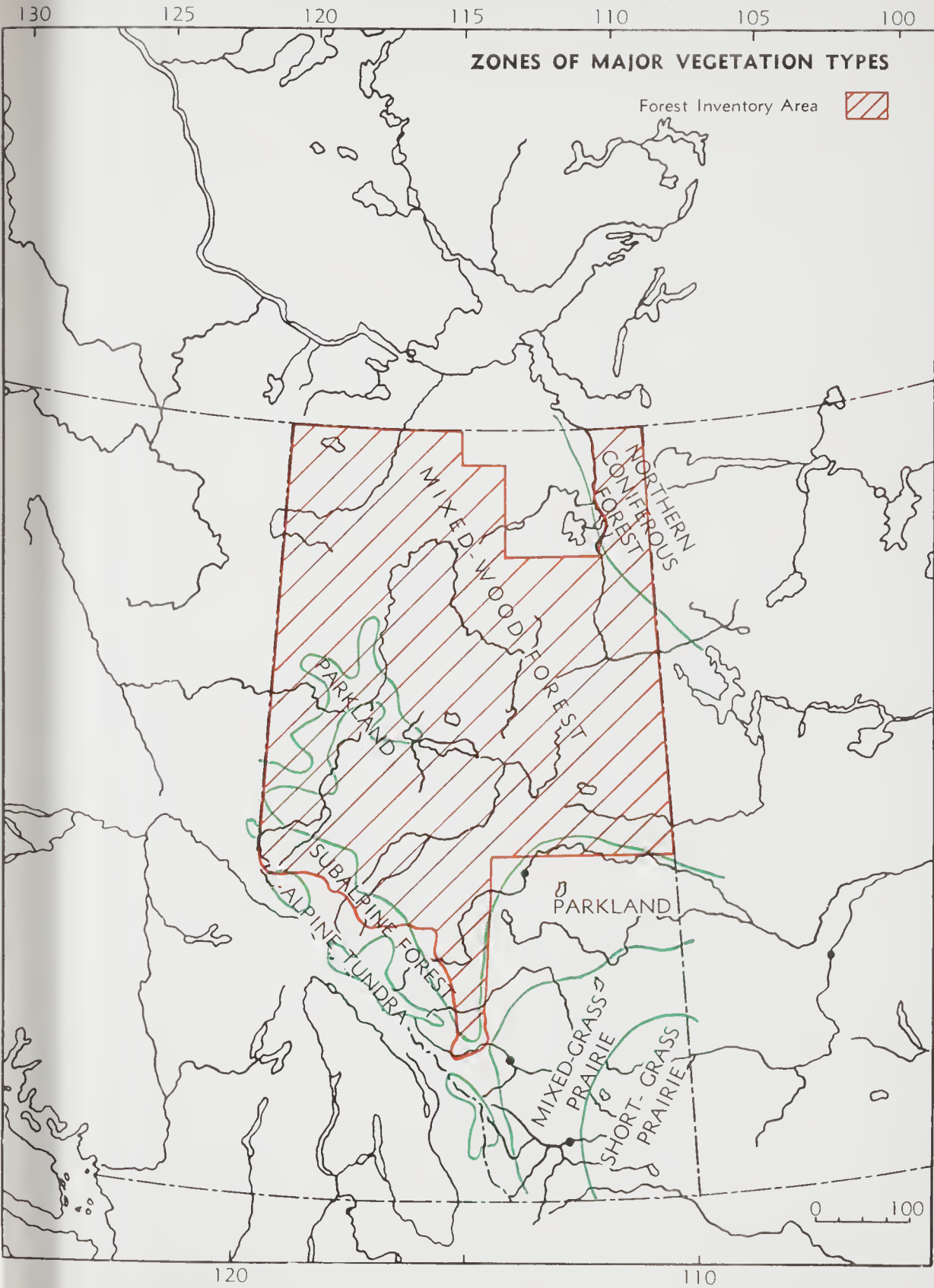
The area covered by a recent Alberta forest inventory amounts to 90,601,225 acres (141,564 square miles). This area comprises 38.5 million acres classified as productive forested land; 25.6 million acres regarded as potential forest land (old burn, recent burn and brushland); and 26.5 million acres of land non-productive with respect to forest growth. The latter includes cleared areas, barren land, scrub land, swamps, muskeg and water.

Trees, four inches or more in diameter at breast height, are classed as merchantable timber. Seventy-five per cent of Canada's merchantable timber is contained in British Columbia, Quebec and Ontario which possess the principal forests of Canada. Alberta ranks fourth among the provinces in its timber resources which amount to somewhat more than 11 per cent of the Canadian total.

The volume of merchantable timber in the area in Alberta covered by the inventory amounts to some 53 billion cubic feet. It has been estimated that 25 per cent of this volume is white spruce and Engelmann spruce; 3.3 per cent, black spruce; 22.3 per cent jack and lodgepole pine; 2.1 per cent, Douglas fir, balsam fir and alpine fir; and 47 per cent, poplar, white birch and other deciduous species.

An estimate made of the maturity of trees in the inventoried area south of the 57th parallel indicates that 6.3 per cent of the trees in this area are regeneration; 38.0 per cent, young; 45.4 per cent, immature; 8.9 per cent, mature; and 1.4 per cent, overmature. Only a small proportion of this forested area is, thus, covered with mature trees. On the whole, the deciduous trees are less mature than the coniferous. In Chapter IV, under Forestry, are discussed the present and potential utilization of these reserves.

NATURAL VEGETATION OF ALBERTA



CHAPTER III

FACILITIES AND SERVICES FOR INDUSTRY

	Page
The People and their Environment	63
Population Characteristics	63
Population Forecasts	64
Labour Force	64
Labour Force Forecast	64
Wages, Labour Legislation and Unionization	80
Education	80
Health and Welfare	80
Housing	81
Transportation and Communications	81
Railways	81
Freight Rates	82
Highways	91
Motor Vehicles	92
Air Transportation	103
Airports	103
Water Transportation	103
Pipelines	109
Communications	110
Government and Industry	115
Industrial Development	116
Planning	121
Pollution of Air and Water	121
Provincial Labour Legislation	121
Government and Finance	122
Provincial Finance	122
Municipal Governments	126

CHARTS AND MAPS

Population of Western Provinces	65
Population of Alberta by Sex and Five Year Age Groups	67
Alberta 1956 Population Density	69
Alberta 1956 Rural Population Density	71
Labour Force in Alberta 1951 related to Population by Age Groups and Sex	73
Province of Alberta : Population Forecasts 1975	75
Highways in Alberta	83
Province Freight Loaded and Unloaded at Stations in Alberta 1956	85
Highway Freight Traffic Density Alberta 1954	87

Trucking Map — Alberta	.....
For Hire Trucks Registered in Alberta : Volume of Inter-Provincial and International Traffic 1956	.....
Air Service in Alberta : Canadian Carriers	.....
Air Service in Alberta : United States Carriers	.....
Water Transportation	.....
Principal Trunk Pipe Lines in Alberta	.....
Major Oil and Gas Pipelines in Alberta	.....

TABLES OF INFORMATION

Table I	Distribution of Non-Agricultural Labour Force by Industrial Groups	.....
Table II	Hourly Rated Wage Earners : Man-Hours and Earnings by Industry : Annual Averages 1954-56	.....
Table III	Monthly Salary and Wage Rates for Selected Occupations, Alberta May 1957	.....
Table IV	Railway Freight Rates — Examples	.....
Table V	Performance by Trucks Registered in Alberta 1956 and Revenue from Operations of "For Hire" Carriers	.....
Table VI	Specimen Truck Freight Commodity Rates	.....
Table VII	Take-offs and Landings at Calgary and Edmonton	.....
Table VIII	Mileage between Principal Points : Mackenzie River System	.....
Table IX	Provincial Government and Other Agencies Offering Services to Industry	.....
Table X	Indebtedness of Canadian Provinces 1957	.....
Table XI	Revenue of the Alberta Provincial Government	.....
Table XII	Expenditures of the Alberta Provincial Government	.....
Table XIII	Financial Statistics for all Alberta Municipal Governments	.....
Table XIV	Financial Statistics of all Alberta Cities	.....
Table XV	Municipal Finances — Calgary and Edmonton	.....

CHAPTER III

FACILITIES AND SERVICES FOR INDUSTRY

Certain basic requirements, in addition to the presence of materials and resources, must be met if industrial development of an area is to be expedited. The labour supply must be adequate, the transportation facilities ample, and the government willing

to create a favourable atmosphere for enterprise. This chapter discusses Alberta's people; transportation and communication facilities; and two aspects of government relations with industry—government services, and government finance.

THE PEOPLE AND THEIR ENVIRONMENT

Alberta's population has grown rapidly in the past decade, as buoyant economic conditions have both increased the birth rate and attracted new population from other areas. From a total of 803,000 in 1946, population climbed to 1,123,000 in

1956—an increase greater than that in the 30 years before 1946. The present rate of natural increase approaches 26,000 per year, while some 13,000 immigrants per year come into Alberta from other parts of Canada and of the world.

Population Characteristics

Alberta has a relatively high birth rate, and the lowest death rate of any Canadian province. In 1956 births were 31.1 per thousand of population, and deaths 6.9; the rate of natural increase was 24.2, compared to a rate of 19.8 per thousand for all Canada. The marriage rate has in recent years been the highest in the country, while average family size is about equal to the national average. The ratio of males to females is higher than in any other Canadian province.

The high rate of natural increase has in a number of years been augmented by immigration. The 1951 Census reported that only 56 per cent of Alberta's population at that time had been born in Alberta. 18 per cent came from other provinces of Canada, 8 per cent from the British Isles, 6 per cent from the United States and 11 per cent from continental European countries. The pattern of ethnic origin of the people (in the same year) differed slightly from the pattern of geographic origin: about half were ethnically British, 12 per cent German or Austrian, and 9 per cent Ukrainian, with Scandinavian, French, Dutch and Polish making up the other major groups. A great variety of religious denominations is established in the province, with adherents of the United Church of Canada and the Roman Catholic Church together making up about half the population.

The distribution of the population by age and

sex in 1956 is graphically shown by a population pyramid. The Alberta population pyramid is similar to that for Canada; both reflect the large immigration since World War II, bulging out in the 25-40 year age groups. In the Alberta pyramid, however, this bulge is more accentuated, and is also more unbalanced towards the male scale. Both pyramids also show a constriction in the 15-24 age groups, representing the decrease in the birth rate during the depression of the 1930's.

Population density for all Alberta averaged 4.51 persons per square mile of land area in 1956, compared to an average density for all Canada (excluding northern territories) of 7.58, and a population density in the United States (in 1950) of 50.7.

Population is most concentrated (above 45 per square mile) in the two divisions in which Edmonton and Calgary respectively are located. The territory between these two divisions, which includes Red Deer, comes next (11.7 per square mile) and is closely followed in density by the division containing Lethbridge (11.4), in the southeast of the province. The division in which Camrose, Vermilion and Lloydminster are located, to the east of Edmonton, ranks next (8.8). Other divisions have densities of between four and seven per square mile. The most sparsely populated areas, with less than two persons per square mile, stretch along the province's western border, cover all of the North, and include the Youngstown census division north of Medicine Hat. The pattern of

rural population density is proportionately similar to that described above. However, the census division in the southeast corner of Alberta, containing Medicine Hat, is among the most thinly populated, because of the prevailing dry climate.

The balance between rural and urban population has changed markedly in recent years. Rural population, which made up over 60 per cent of the total in 1941, had decreased to just over 40 per cent by 1956. On June 1, 1956, there were eight cities*, eighty towns and 145 incorporated villages, in Alberta, with populations totalling as follows:

				Percentage of Total Population of Alberta
Cities	-	-	- 483,333	43.0
Towns	-	-	- 149,121	13.3
Villages		-	- 45,188	4.0
			-----	---
Total	-	-	- 677,642	60.3

Population Forecast

Several forecasts of future Alberta population have recently been made by authoritative sources. The forecast adopted in this report is higher than any of these, mainly because of our belief that continuing economic growth in Alberta will cause continued immigration at the same rate as that of recent years.

It is assumed that the annual average rate of population growth of 3.6 per cent, experienced from 1951 to 1956, will be maintained to the end of our forecast period, giving 2,200,000 as the forecast of total Alberta population in 1975.

The Labour Force

The Alberta labour force has increased from 347,000 persons in 1951 to 415,000 in 1957. Over this period it has remained a nearly constant 36-37 per cent of the population, and some 54 per cent of the population over fourteen years of age. As an overall average, 84 per cent of all males and 20 per cent of all females over fourteen are considered to be part of the labour force.

Analysing the labour force into broad groups, it is seen (as would be expected) that 20-64 year group is decidedly dominant, with 54 per cent of the group forming much the major part of the group. With increasing urbanization, however, the proportion of females in the labour force has gradually grown—from 14 per cent of the total force in 1951 to 21 per cent in 1957. A relatively high proportion of men over 65 are employed.

As recently as 1941, half the Alberta labour force was agricultural. This proportion has fallen to 29 per cent by 1957, and is continuing to decline. At the same time the standard of education of Alberta workers has been increasing; the percentage of male workers with four years' schooling fell from 12.5 in 1941 to 8.1 in 1951.

The distribution of non-agricultural workers in industry is shown in Table 1. All industrial groups except the fishing and trapping industry employed more people in 1951 than in 1931. It is interesting to note that, until 1951, the growth in exploration and drilling for oil and gas had not employed enough persons to increase the relative proportion of employment in the mining industry. However, counterbalanced the declines in employment in the coal industry.

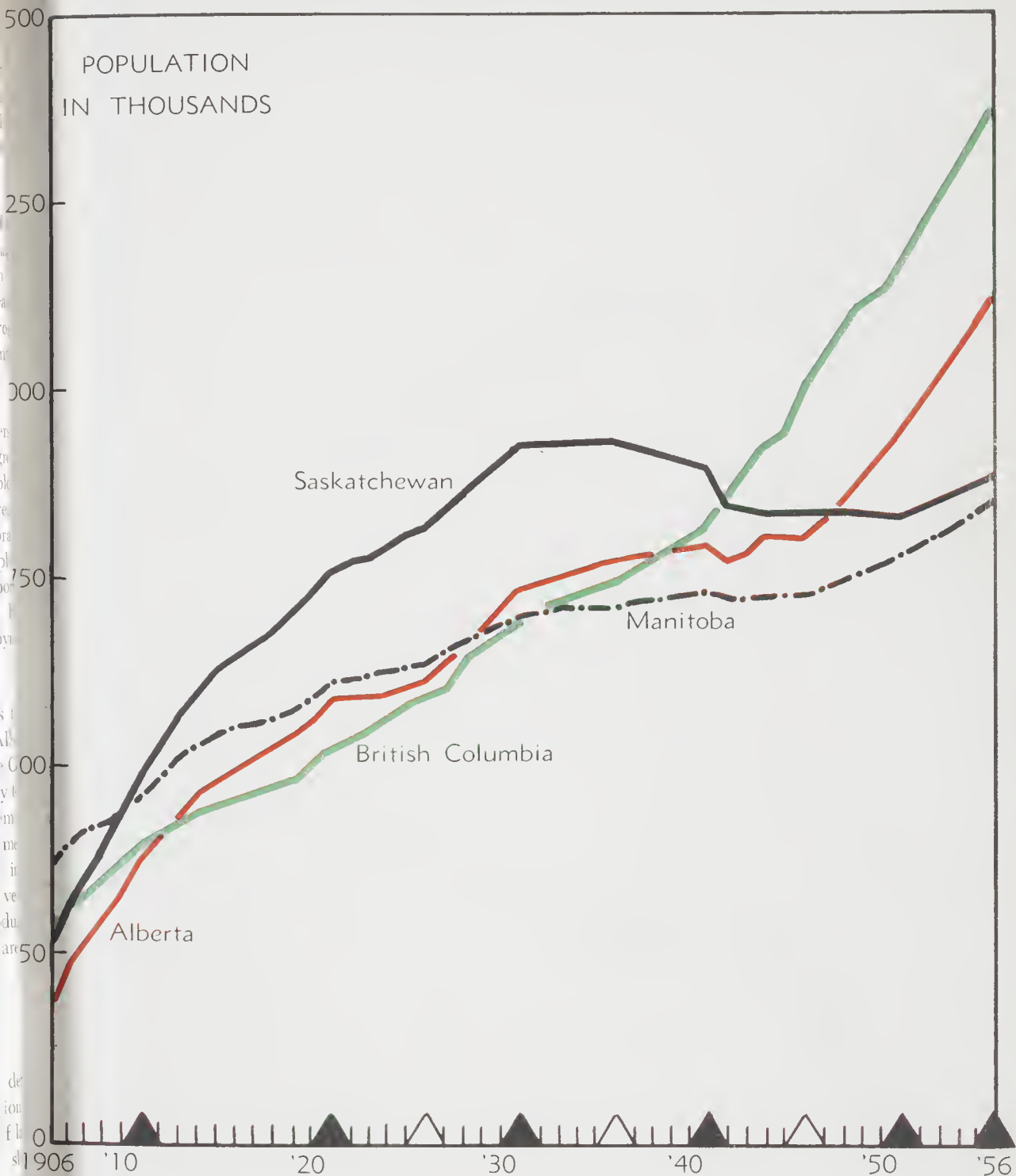
Since the depression years of the 1930s there has been relatively little unemployment in Alberta and the overall unemployment rate below the Canadian average. However, the prairie economy tends to have a relatively high rate of seasonal unemployment, and there are often two to three months when many persons are out of work in the winter and early summer. This problem is becoming less serious in Alberta as dependence on agricultural industry lessens, and as more construction activities are carried on through the winter.

Labour Force Forecast

The labour force forecast used here is derived from the forecast of Alberta's 1975 population (2,200,000 millions) adopted above. The proportion of labour force to population is expected to increase slightly over the next few decades, and certainly will not decrease. It is estimated conservatively that the total Alberta labour force in 1975 will be 36 per cent of the population, as at present, or over 800,000 persons.

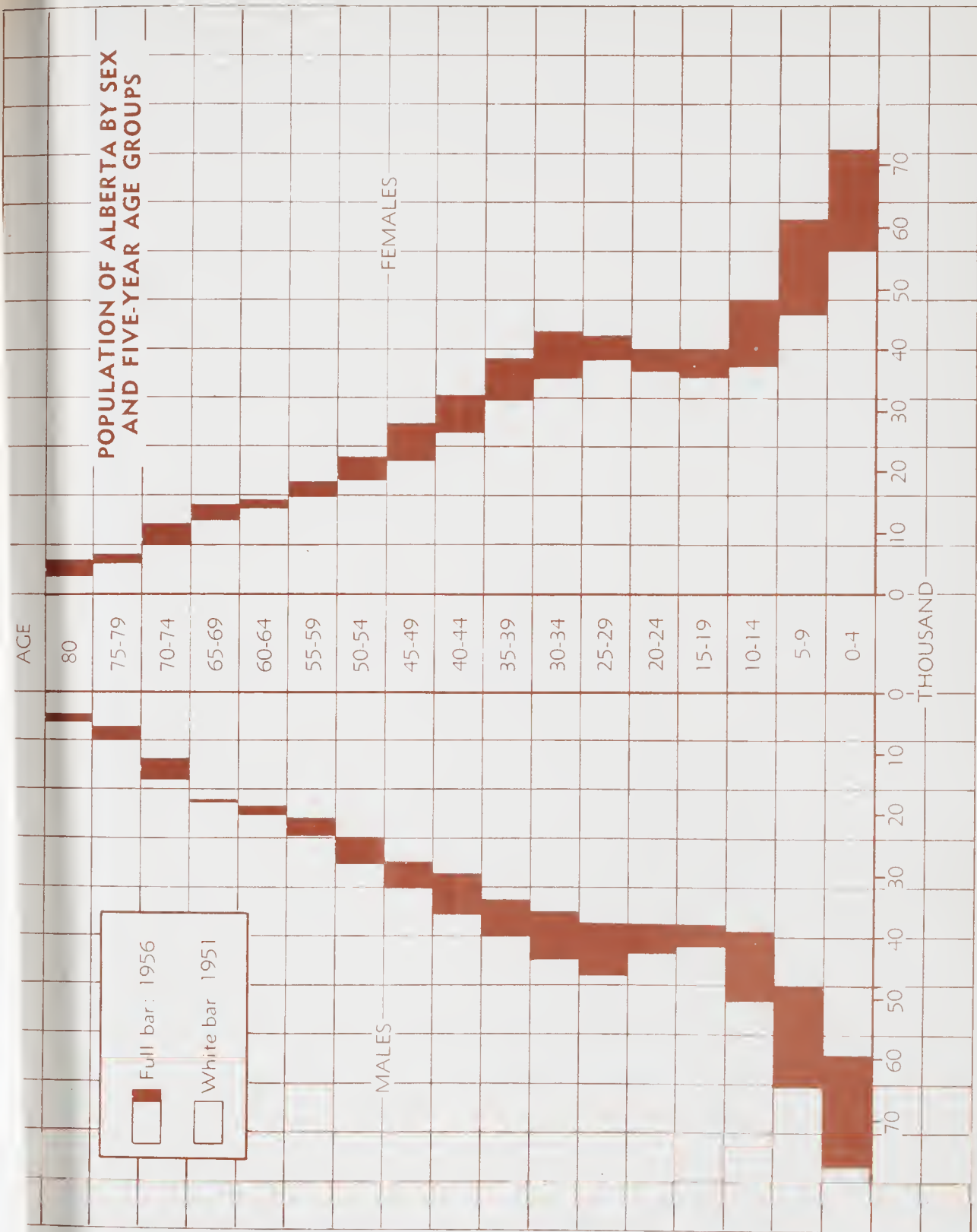
* Grande Prairie became the ninth city in January, 1958.

POPULATION OF WESTERN PROVINCES



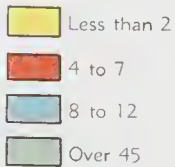
Census years are indicated as follows: Canada, Prairie Provinces.

SOURCE: Dominion Bureau of Statistics.

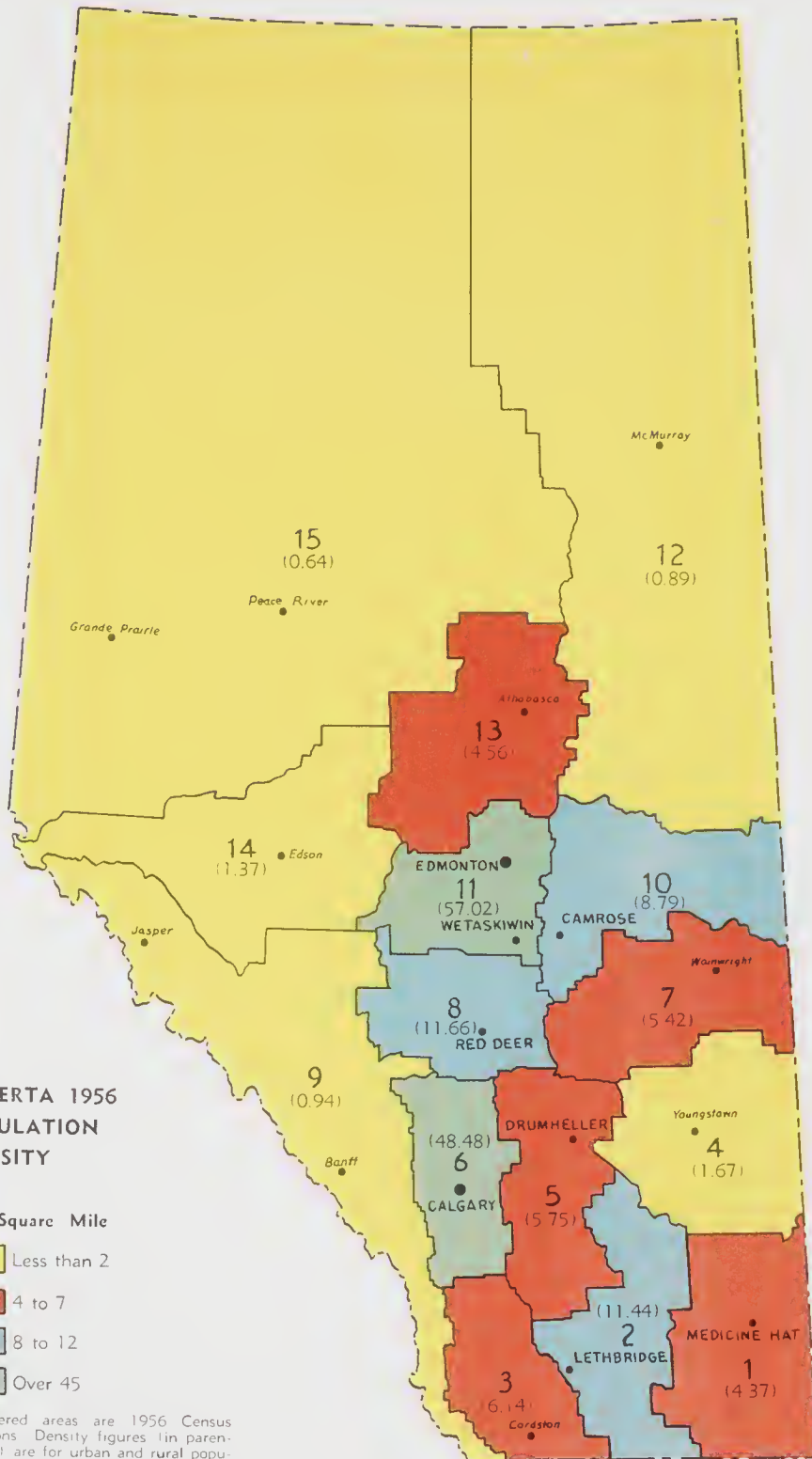


ALBERTA 1956 POPULATION DENSITY

Per Square Mile



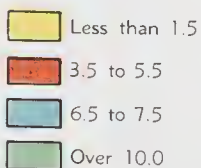
Numbered areas are 1956 Census Divisions. Density figures (in parentheses) are for urban and rural populations combined.



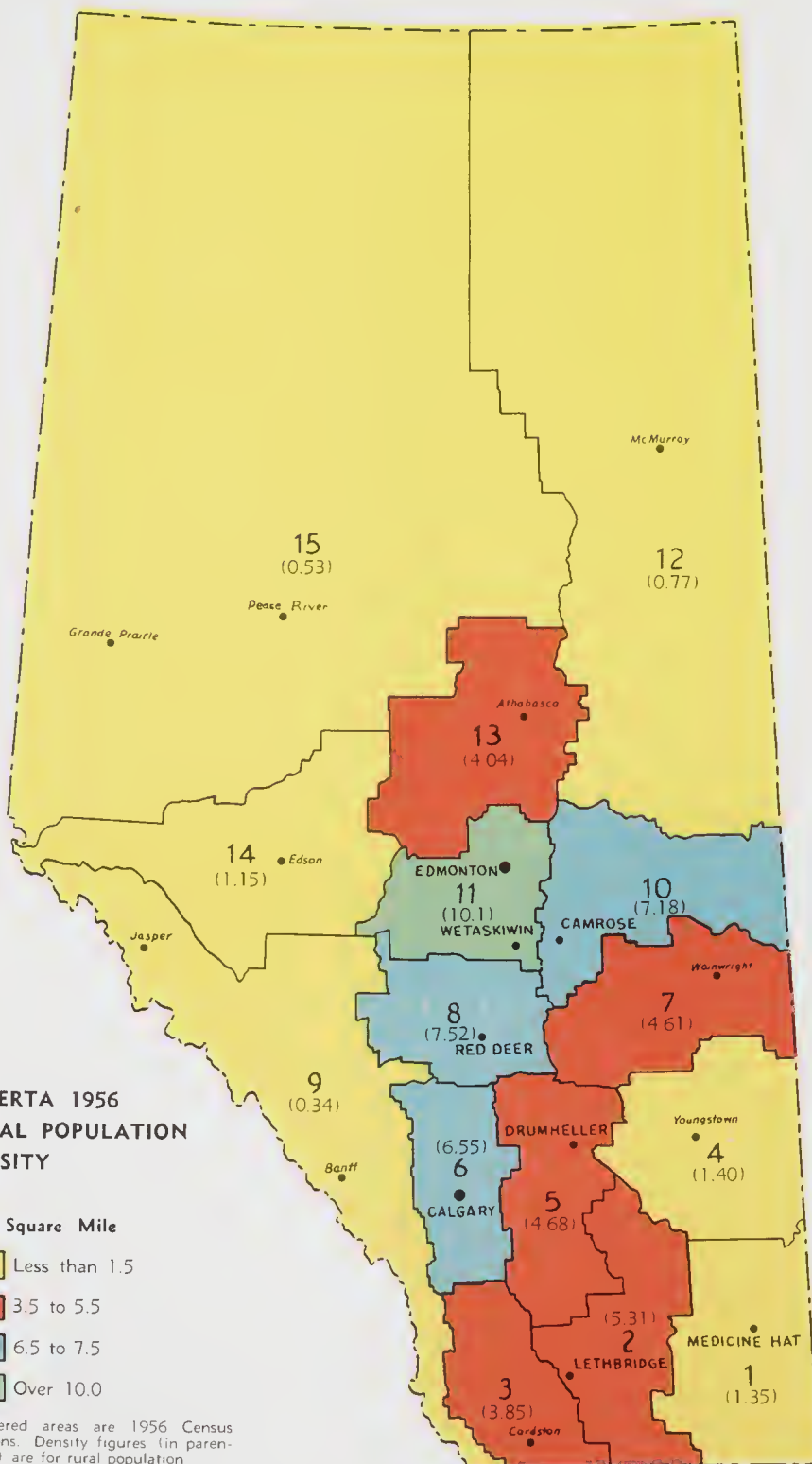


ALBERTA 1956 RURAL POPULATION DENSITY

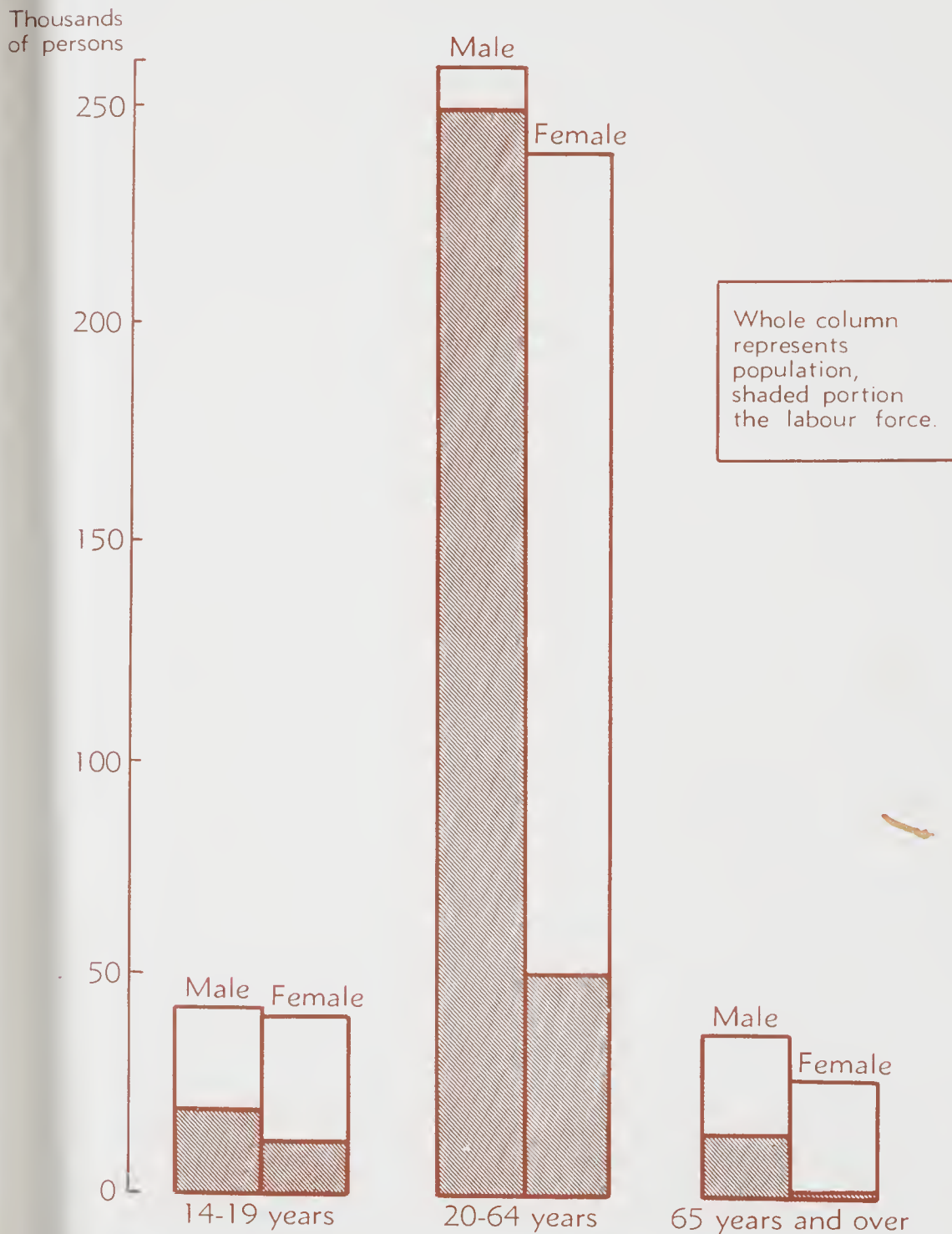
Per Square Mile



Numbered areas are 1956 Census Divisions. Density figures (in parentheses) are for rural population



LABOUR FORCE IN ALBERTA, 1951 RELATED TO POPULATION BY AGE GROUPS AND SEX



Note: Data excludes armed forces, Indians on reserves, and inmates of institutions.

PROVINCE OF ALBERTA: POPULATION FORECASTS 1975

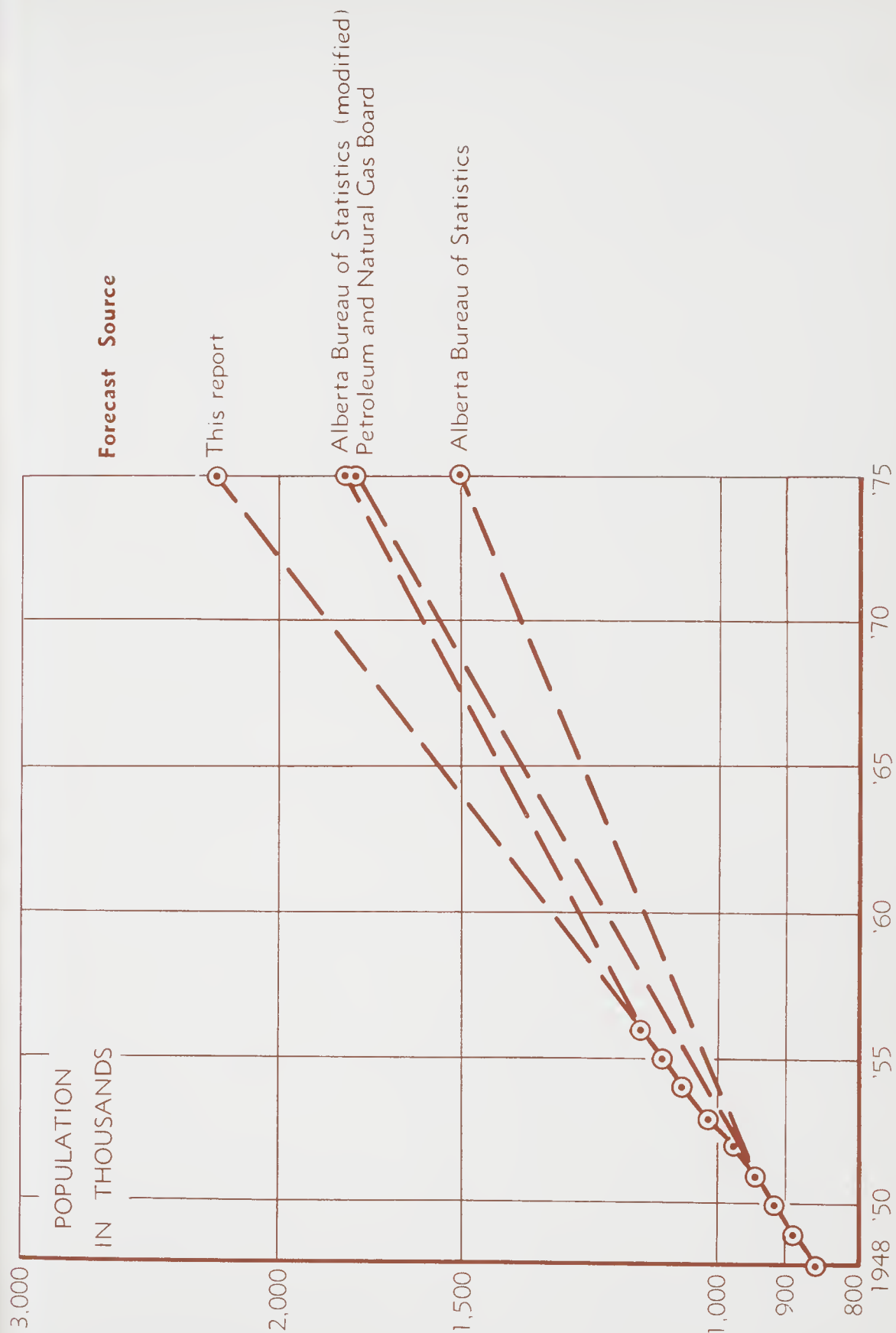


TABLE I

DISTRIBUTION OF NON-AGRICULTURAL LABOUR FORCE BY INDUSTRY GROUPS

INDUSTRY	1931			1941			1951		
	Number (thousands)	Per cent of Total Industrial Labour Force		Number (thousands)	Per cent of Total Industrial Labour Force		Number (thousands)	Per cent of Total Industrial Labour Force	
Forestry and Logging	-	-	-	0.6	0.4	-	1.2	0.8	0.7
Fishing and Trapping	-	-	-	2.1	1.5	-	3.0	2.0	0.4
Mining and Oil	-	-	-	10.9	7.8	-	10.0	6.8	6.6
Manufacturing	-	-	-	13.9	9.9	-	22.8	15.5	14.9
Electric Power	-	-	-	0.6	0.4	-	1.0	0.7	1.4
Construction	-	-	-	10.7	7.6	-	10.4	7.1	10.8
Transportation and Communications	-	-	-	20.2	14.4	-	17.9	12.2	11.3
Trade	-	-	-	21.9	15.6	-	26.2	17.9	19.6
Finance and Insurance	-	-	-	4.8	3.4	-	4.0	2.7	3.3
Service	-	-	-	47.7	34.0	-	48.5	33.1	30.0
Other	-	-	-	7.0	5.0	-	1.8	1.2	1.0
	---	---	---	---	---	---	---	---	---
Total	-	-	-	140.4	100.0	-	146.8	100.0	100.0

SOURCE: Census of Canada, 1931-51. (Latest available figures).

TABLE II

HOURLY RATED WAGE EARNERS—MAN-HOURS AND EARNINGS BY INDUSTRY— ANNUAL AVERAGES 1954-56

INDUSTRY	1954				1955				1956			
	Alberta & Northwest Territories		Edmonton		Alberta & Northwest Territories		Edmonton		Alberta & Northwest Territories		Edmonton	
	Canada	Calgary	Calgary	Calgary	Canada	Calgary	Calgary	Calgary	Canada	Calgary	Calgary	Calgary
	(a) Average hours											
Coal Mining -	-	-	-	-	39.5	31.4	-	-	40.7	34.6	-	-
Oil and natural gas production -	38.3	30.0	-	-	44.3	44.6	-	-	44.4	44.5	-	-
Manufacturing -	43.1	43.5	-	-	41.0	40.1	40.5	39.3	41.1	40.1	40.8	39.5
Building construction -	40.6	40.0	40.1	-	39.5	38.1	-	-	41.0	41.8	-	-
Transportation -	39.8	38.6	-	-	44.9	40.9	-	-	44.5	40.9	-	-
Service establishments -	45.1	40.4	-	-	40.4	40.3	-	-	40.3	40.5	-	-
	40.9	40.7	-	-								
	(b) Average hourly earnings (in cents)											
Coal Mining -	-	-	-	-	148.1	181.7	-	-	149.2	185.2	-	-
Oil and natural gas production -	148.4	181.6	-	-	173.9	177.1	-	-	189.8	193.2	-	-
Manufacturing -	169.7	172.9	-	-	144.5	150.8	151.3	157.0	151.5	156.1	155.9	162.4
Building construction -	140.8	146.0	147.0	154.0	162.5	170.4	-	-	176.5	191.2	-	-
Transportation -	160.6	165.2	-	-	144.4	152.7	-	-	151.2	158.8	-	-
Service establishments -	140.2	148.7	-	-	85.6	89.4	-	-	89.0	91.5	-	-
	83.0	88.8	-	-								
	(c) Average weekly wages (in dollars)											
Coal Mining -	-	-	-	-	58.50	57.05	-	-	60.72	64.08	-	-
Oil and natural gas production -	56.84	54.48	-	-	77.04	78.99	-	-	84.27	85.97	-	-
Manufacturing -	73.14	75.21	-	-	59.25	60.47	61.28	61.70	62.27	62.60	63.61	64.15
Building construction -	57.16	58.40	58.95	61.14	64.19	64.92	-	-	72.37	79.92	-	-
Transportation -	63.92	63.77	-	-	64.84	62.45	-	-	67.28	64.95	-	-
Service establishments -	63.23	60.07	-	-	54.00	50.00	-	-	55.67	57.06	-	-
	33.95	36.14	-	-								

TABLE III

MONTHLY SALARY AND WAGE RATES FOR SELECTED OCCUPATIONS—ALBERTA, MAY, 1957

(All figures in Dollars)

POSITION	Sex	Alberta		Calgary		Edmonton		Lethbridge		Medicine Hat	
		Range	Average	Range	Average	Range	Average	Range	Average	Range	Average
General	- - - Male	170-500	295	190-487	307	180-449	286	205-335	256	179-329	259
(Intermediate) Clerk	- Female	121-342	207	121-342	213	145-300	209	121-240	179	130-225	175
Stenographer	- - - Female	135-353	230	156-353	246	150-320	216	135-242	187	150-243	181
Civil Engineer	- - - Male	375-1,000	560	375-1,000	583	395-700	536				
Draftsman	- - - Male	200-550	342	250-550	354	200-535	336	210-325	282		
Nurse (R.N.)	- - - Female	200-380	249	211-380	245	200-335	248	225-325	253	205-425	261
Labourer	- - - Male	140-324	242	190-324	253	190-320	239	164-305	224	140-286	228
Labour Foreman	- - - Male	213-475	309	234-390	301	238-475	314	213-385	302	242-400	321
Automobile Mechanic	- Male	190-400	323	190-400	322	238-400	323	209-333	327	277-333	327
Home Furnishings	- Male	180-548	327	238-541	322	260-498	376	180-430	341	200-271	238
Salesperson	- - - Female	121-238	187	150-238	186	170-235	199	191-277	234	121-166	140

Notes: Averages are weighted. Occupations have been selected from a wide range of positions treated by the source publication.

SOURCE: Wage and Salary Rate Survey — Alberta.

Wages, Labour Legislation and Unionization

A selection of wage rates for certain hourly-rated workers is given in Table II, and a selection of monthly salary ranges for certain trades and professions in Table III. It will be noted that wages and salaries in Calgary generally exceed those in Edmonton, while in both cities they are generally higher than the average for the province.

Alberta's labour legislation is contained in the Alberta Labour Act, most recently revised in 1954. The Act applies to most workers, except domestic servants and farm labourers. It fixes the maximum work week at 48 hours (44 in major cities), sets minimum wages and provides for paid vacations. It also gives legal status to trade unions, which may apply for certification as bargaining agents when they represent a majority of employees in an establishment. The Act provides for collective bargaining, for conciliation in case of disagreement, and for non-compulsory arbitration.

The success of the conciliation and arbitration procedures may be judged from figures for 1956. In that year, 122 applications for conciliation were received; of 93 conciliations completed, 75 were successful, and only four strikes ensued after all provisions of the Act had been complied with.

Alberta labour union officials have stated their belief that labour-management relations in Alberta are of a higher standard than in almost any other part of Canada, and that labour legislation is generally fair and satisfactory. In recent years, the number of workers involved in strikes in Alberta has been less than two per cent of the Canadian total.

Education

High educational standards in Alberta have largely been attained by paying teachers' salaries well above the Canadian average, lower only than those paid in British Columbia:

Median Salaries - 1953-1954

	Alberta	Canada
All teachers - - - - -	\$3,013	\$2,654
One-room rural teachers - -	\$2,644	\$2,077

In 1955-1956 there were about 224,000 pupils enrolled, and 7,800 school rooms were operating, giving a relatively low average of 29 pupils per room.

The government-supported University of Alberta has its main campus at Edmonton, but activities are also carried on at Calgary, at Banff, and at Lethbridge. The University offers a full range of courses: Arts and Science, Agriculture, Dentistry, Education, Engineering, Law, Medicine, Pharmacy, Graduate Studies; Commerce, Household Economics, Nursing, Physical Education and Physiotherapy. Enrolment in 1956-1957 totalled nearly 4,500 full-time students, excluding those at the Banff school.

An institution of wide reputation, the Banff School of Fine Arts was established by the University of Alberta at Banff in 1933. It offers a wide selection of courses in theatre, ballet, painting, music, playwriting, short story and radio writing, handicrafts including weaving, leathercraft, ceramics and interior decoration, oral French and photography. The enrolment of fine arts students during the summer of 1956 was approximately 500.

During six weeks each winter the Banff campus houses the School of Advanced Management which is sponsored jointly by the Universities of Alberta, British Columbia, Saskatchewan and Manitoba. Executive training courses are attended by business executives, and senior personnel of the armed forces, the civil service and labour organizations, from all over Western Canada.

The Alberta Department of Agriculture operates schools of agriculture and home economics at the following locations, and the Provincial Institute of Technology and Art at Calgary gives day and evening courses in a number of trades and crafts. An apprenticeship program is well developed. Apprenticeship training is offered in seventeen trades, none of which apprenticeship is required by law.

Health and Welfare

In Alberta there are more than 13,000 public hospital beds, over 1,000 doctors and nearly 400 dentists. On a per capita basis, health facilities are on a par with or superior to those elsewhere in Canada.

The Province of Alberta Hospital Insurance Plan that came into effect April 1st, 1958, is now

nized as fulfilling the requirements of the Federal Government Hospital Insurance scheme. The Alberta Plan provides treatment on a standard ward care basis for all residents who have been in the Province for twelve months. When the Federal Government enters into the cost-sharing agreement with the Province all persons entitled to reside in Canada and living in Alberta will be eligible.

The cost of the new program will be borne by the patient, municipality and the Provincial Government. The patient's contribution will be based on the hospital size and will vary from \$1.50 per day to \$2.00 per day. Municipalities will be assessed 9/12 of an amount computed on the basis of three mills and an equalized assessment to apply to the operating cost of the hospital. The Provincial Government share will be determined separately for each hospital. There will, however, be a ceiling rate adopted. For 1958 the ceiling rate will be \$10.00 per rated bed day for standard ward care. Should the ceiling rate be exceeded by a hospital the Province will make payment for approved costs and the Municipality will make up the portion of the excess not approved.

Non-residents will be charged from \$11.00 per day to \$15.00 per patient day for standard ward care depending on the hospital. The Province will also continue to meet charges for poliomyelites, social welfare recipients, arthritic cases, tubercular, and mentally ill patients.

Provision for out-patient services is not included at the present time, however, municipalities may

enter into agreement with hospitals covering out-patient services.

Many welfare services are the responsibility of the Canadian Government, which provides family allowances, old age security pensions, and unemployment insurance. The Federal Government also administers welfare programs for Indians and Eskimos, and farm assistance through the Department of Agriculture. The Prairie Farm Assistance Act provides for direct money payments on an acreage basis to farmers in areas of low crop yields.

In cases where unemployment relief is required, Alberta municipalities are initially responsible. Through an arrangement between the province and the municipality, however, the province will assume 60 per cent of the cost of such assistance. Single men without means who become unemployed through ill-health or non-availability of work are cared for in hostels at Calgary and Edmonton.

Housing

An outstanding feature of the Alberta housing picture is the high proportion of single houses. Some 85 per cent of Alberta households occupy single dwellings, and only 15 per cent live in apartments or flats; the comparable proportions for all Canada are 75 and 25 per cent.

About 69 per cent of the dwellings in Alberta are owned by the occupants. The average number of persons per dwelling in 1956 was 3.8, well below the Canadian average of 4.0.

TRANSPORTATION AND COMMUNICATIONS

All major forms of transportation are important in Alberta. Since they reached the province, near the end of the nineteenth century, railways have fostered economic growth. Truck transport is increasingly used, and has also played an important part in opening up the northern areas. Especially along the Alaska and Mackenzie Highways, which are not served by rail. Aircraft have greatly assisted the rapid development of the territory lying north of Alberta, as have the vessels which ply the northern waterways.

Railways

Alberta's 5,700 miles of single track form about one-eighth of the Canadian total and give an average of about five miles of track per thousand persons, or 36 miles per thousand square miles of area. Alberta has a higher ratio of railway track per capita than Ontario, Quebec or British Columbia, and a denser rail network in its productive land area than Quebec or British Columbia.

Railway companies and track mileage operated in Alberta at December 31, 1956, were as follows:

	Canadian National Railways	Canadian Pacific Railway	Northern Alberta Railways
First main track - - - - -	2,194	2,580	905
Second main track - - - - -	26	14	—
Spurs, sidings and yard tracks - - -	591	746	141

Canadian National Railways' transcontinental service runs from Montreal and Toronto to Vancouver via Winnipeg, Saskatoon, Edmonton and Jasper. The company operates also between Winnipeg and Calgary via Saskatoon and Drumheller, between Edmonton and Calgary, and through an extensive rail network in central and northern Alberta.

The Canadian Pacific Railway's transcontinental line passes through Medicine Hat, Calgary, Banff and Lake Louise. The company operates an extensive rail network in central and southern Alberta which includes lines between Medicine Hat and Vancouver via Lethbridge and Crowsnest, between Edmonton and Calgary, and between Lethbridge and Coutts, the connecting point for southbound traffic into Montana.

Northern Alberta Railways, owned jointly by Canadian National and Canadian Pacific, operate from Edmonton to terminal points at Waterways, Barrhead, Hines Creek, Spirit River and Dawson Creek, British Columbia.

Passenger services are operated on all of the Northern Alberta Railways' lines, and on almost all lines of the other two companies.

Specimen schedule timings out of points in Alberta to main Canadian cities via the fast transcontinental trains are as follows:

	Via "Super Continental"
	Hours and Minutes
Edmonton to—	
Vancouver	22:20
Saskatoon	6:40
Winnipeg	16:45
Toronto	46:05
Montreal	48:55

	Via "The Canadian"
Calgary to—	
Vancouver	21:20
Regina	9:12
Winnipeg	15:50
Toronto	45:35
Montreal	49:00

Several diesel rail car services daily are operated between Edmonton and Calgary by the two railway companies, and from Calgary to Lethbridge by the Canadian Pacific Railway. The Medicine Hat-Crowsnest Pass and Kettle Valley route to Vancouver is also served by diesel rail car.

Freight Rates

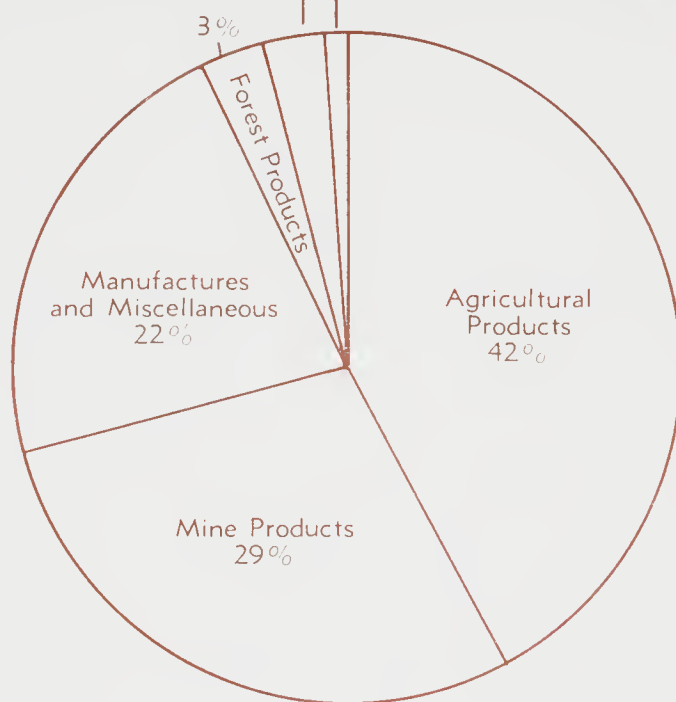
Because of the location of Alberta, separated on the one side from the Pacific by mountains and on the other side from major markets by long distances, freight rates on goods coming into and going out of the province are relatively high. This raises the final price of goods brought in, but serves also as a protective barrier which fosters the establishment of local industry to supply the local market as it grows.

Many Alberta authorities, however, hold to the belief that any decrease in rates would be of far more benefit than detriment to the province. While local industries would be faced with greater competition if freight rates were lower, industries supplying other areas would be benefited, and on the latter industries largely depends the continuing rapid economic growth of Alberta.

Agreed charge legislation has caused considerable grievance in Alberta, where it is felt that an anomaly in Canadian railway legislation allows

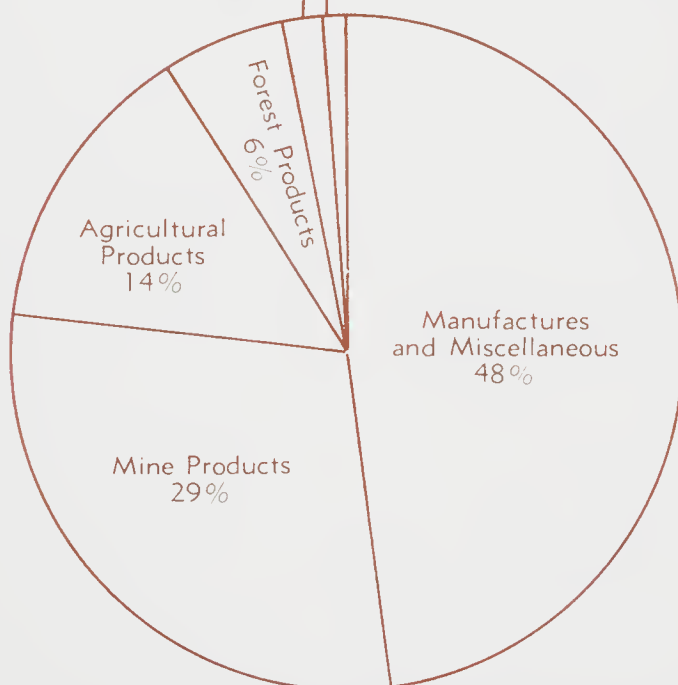
REVENUE FREIGHT LOADED AT STATIONS IN ALBERTA, 1956

Animals and animal products 3% All L.C.L. freight 1%



REVENUE FREIGHT UNLOADED AT STATIONS IN ALBERTA, 1956

All L.C.L. freight 2% Animals and animal products 1%



Note: All shipments in carloads except sectors designated "All L.C.L. freight".

SOURCE: Dominion Bureau of Statistics.

RAILWAY FREIGHT TRAFFIC DENSITY, ALBERTA, 1954

Only tracks which carried in excess of 500 000 ton-miles per mile in either direction are shown

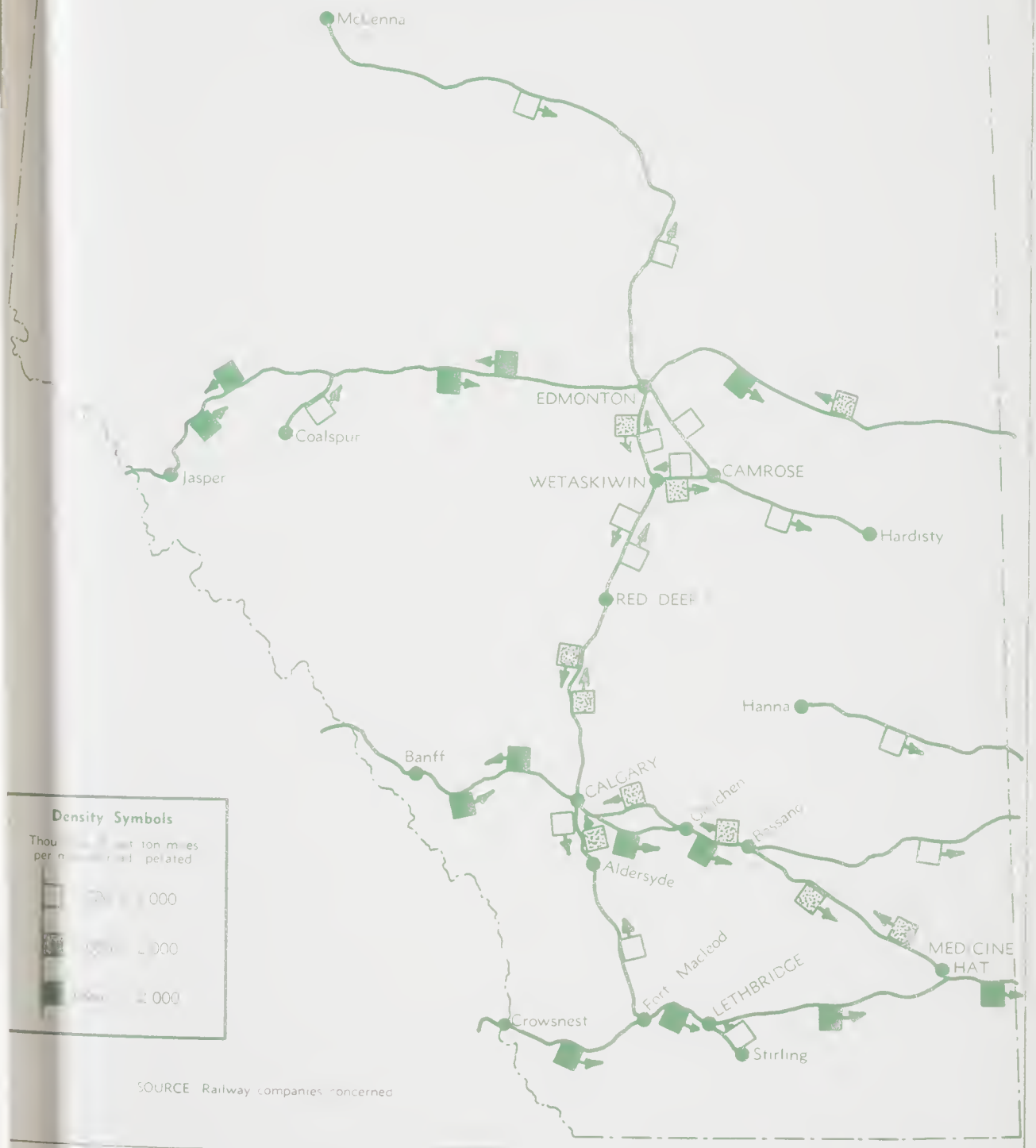


TABLE IV

RAILWAY FREIGHT RATES

(All rates in cents per 100 pounds except as noted)

LUMBER ^(a)

From:	To:	Calgary Alta.	Edmonton Alta.	Bismarck N.D.	Denver Colo.
Winnipeg, Alta.	- - - - -	48	26	173	166
Vancouver, B.C.	- - - - -	72	—	—	—
Prince Albert, Sask.	- - - - -	—	52	—	—
Prince Rupert, B.C.	- - - - -	—	82	—	—
Madison, Wis.	- - - - -	—	—	103	—
Fort William, Ont.	- - - - -	—	—	87	—
Portland, Ore.	- - - - -	—	—	—	100
Seattle, Wash.	- - - - -	—	—	—	100

SUGAR ^(b)

From:	To:	Winnipeg Man.
Taber, Alta.	- - - - -	118
Vancouver, B.C.	- - - - -	193
Montreal, Que.	- - - - -	215

FURNITURE

From:	To:	Calgary Alta.
Edmonton, Alta.	- - - - -	30
Winnipeg, Man.	- - - - -	130
Vancouver, B.C.	- - - - -	191

STRUCTURAL STEEL

From:	To:	Calgary Alta.
Edmonton, Alta.	- - - - -	65
Winnipeg, Man.	- - - - -	130
Vancouver, B.C.	- - - - -	139
Sault Ste. Marie, Ont.	- - - - -	242.5

(a) Rates are illustrative only, as the types of lumber shipped are quite different.

(b) Rates are illustrative only; actually, the Manitoba sugar market is mainly supplied by local production.

TABLE IV (Continued)

RAILWAY FREIGHT RATES

(All rates in cents per 100 pounds except as noted)

PIPE, STEEL

From:	To:								Calgary Alta.
Vancouver, B.C.	-	-	-	-	-	-	-	-	133
Morris, Man.	-	-	-	-	-	-	-	-	141
Edmonton, Alta.	-	-	-	-	-	-	-	-	46
Sault Ste. Marie, Ont.	-	-	-	-	-	-	-	-	144

SKELP (for Pipe Manufacture)

From:	To:								Vancouver B.C.	Edmonton Alta.	Calgary Alta.	Morris Man.
Hamilton, Ont.	-	-	-	-	-	-	-	-	95	150	209	111

FERTILIZER (in cents per ton)

From:	To:								Minneapolis Minn.	Sault Ste. Mar Mich.
Calgary, Alta.	-	-	-	-	-	-	-	-	1,600	1,714
Medicine Hat, Alta.	-	-	-	-	-	-	-	-	1,466	1,773
Kimberley, B.C.	-	-	-	-	-	-	-	-	1,715	1,939
Warfield, B.C.	-	-	-	-	-	-	-	-	1,811	2,016

unjustifiable situation to exist. Section 337 of the Canadian Railway Act provides that goods hauled a longer distance must pay a minimum of one and one-third the freight charged goods hauled a shorter distance along the same line. However, it has been rendered largely ineffective by a part of the Canadian Transport Act which allows 'agreed charges'—contracts made between the carrier and individuals, by which the latter obtain special low rates, normally in return for guaranteeing to move a certain quantity or percentage of output by the carrier.

Some of the effects of agreed charges now in force have been cited: Window glass, from Montreal, Quebec, to the Pacific port of Vancouver—\$2.00 per hundred pounds; to Calgary or Edmonton, \$3.55. Steel sheets and plates, from Hamilton, Ontario, to Vancouver, \$1.20; to Calgary or Edmonton, \$2.65. Steel skelp from Sault St. Marie, Ontario, to Vancouver, \$0.95; to Edmonton, \$1.52. Instances have been cited where it was cheaper to pay the freight charge from Eastern Canada to Vancouver, and the return charge from Vancouver to Alberta, than to pay the single charge to Alberta.

Alberta authorities point out that industry has in certain known cases decided to locate in Vancouver rather than in Alberta because raw materials could be obtained more cheaply from Eastern Canada in Vancouver. This is probably the worst possible effect of the existing situation. Representations have been, and are being made to the Canadian Government requesting some change in law or policy.

Other problems of detail, such as high per-ton-mile rates for short hauls and the refusal of rail-

ways in certain instances to establish uniform rate zones for individual commodities, are pressing. Many would agree, however, that the major long-term problem is that of holding long-haul freight rates to the lowest possible level, thus permitting important Alberta products to be competitive in distant markets.

The relative position of certain Alberta producers is illustrated in Table IV, which shows some selected freight rates. A few rates on goods coming into the province are also given and the present rates on steel, as an example, suggest considerable advantages to local steel industries when the local market will support plants of economic size.

Highways

The construction of a network of all-weather highways is part of provincial government policy. During 1956-1957, \$42.5 million was expended on the construction of main highways, bridges and ferries, and the 1957-1958 budget allocated \$44.9 million for this purpose. Highway maintenance expenditure, grants to municipalities for district highways, and sundry related items were estimated to amount to a further \$18.5 million in the 1957-1958 fiscal year, bringing total expenditure for that year on highways and related projects to \$63.4 million. These figures emphasize the increase in the road building program since 1946-1947 when the total expenditure was only \$7.0 million.

The progress made in the provision of surfaced highways is apparent from the following mileage data:

HIGHWAY MILEAGE, ALBERTA

	1946		1956	
	Miles	Per cent	Miles	Per cent
Paved - - - - -	531	—	2,315	3
Gravel or Crushed Stone - - - - -	9,316	12	32,896	38
Improved earth or other earth - - - - -	70,262	88	51,166	59
Total - - - - -	80,109	100	86,386	100

In 1946 only 12 per cent of Alberta highways were surfaced: in 1956 this proportion was 41 per

cent. Of the main highway system—totalling 5,200 miles—99 per cent has now been surfaced.

Main paved highways include the following:

Highway No. 1
(Trans Canada Highway)

Highway No. 2

Highway No. 3

Highway No. 4

Highway No. 16

Highway No. 5 }
Highway No. 9 }
Highway No. 12 }
Highway No. 13 }
Highway No. 14 }

Medicine Hat - Calgary - Banff - Lake Louise

Clyde - Edmonton - Calgary - Fort Macleod
Carway (border)

Medicine Hat - Lethbridge - Fort Macleod
Crownsnest

Lethbridge - Coutts (border)

Lloydminster - Edmonton - Jasper

Nearing complete paving.

These are east-west trans-provincial highways carrying considerable international traffic.

Edmonton is the terminal for the Mackenzie Highway which runs from Grimshaw Alberta, to Hay River Northwest Territories, and for the Alaska Highway which runs from Dawson Creek British Columbia, to Whitehorse Yukon, and Fairbanks Alaska. Extension of the Mackenzie Highway through Yellowknife by way of Fort Providence and Fort Rae is scheduled for completion by 1960.

In addition to roads provided by the province, much valuable road-building work has been done in more isolated regions by geophysical crews and other oil exploration parties. A very considerable mileage of these roads exists, and will eventually become part of the highway network of the province.

Motor Vehicles

As at March 31, 1957, the following types and numbers of motor vehicles were registered in Alberta:

Passenger cars, general use	255,029
Taxicabs	812
"Drive yourself" cars	336
Trucks & tractors (non-agricultural)	121,190
Buses, general use	553

School buses

Motorcycles

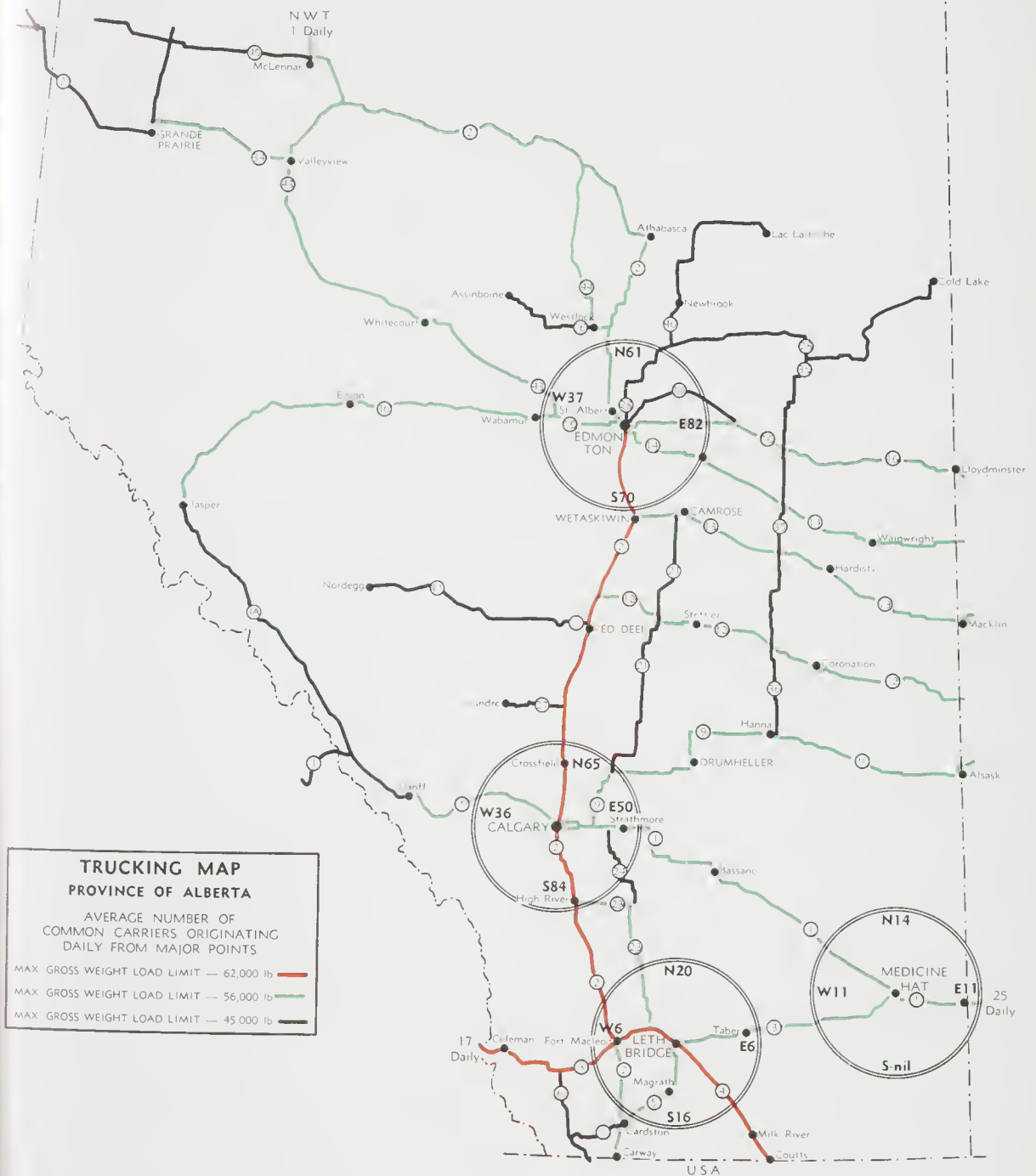
389,539 drivers' licenses and 66,094 chauffeur licences were in force.

In 1957, Alberta had the greatest number of motor vehicles per capita of any province in Canada. The ratios of passenger cars per capita and per family were also high, although Ontario and British Columbia had a slight lead over Alberta in both respects.

There are in excess of 280 trucking companies in Alberta operating as common carriers. Fifty of these are large firms serving Alberta industries. Three provide regular schedules to Ontario - Quebec points, six to Vancouver, and three to United States points. The cities of Winnipeg, Regina, and Saskatoon are served daily. The Dominion Bureau of Statistics undertook a sampling survey of truck transportation in Alberta which indicates the average registration of trucks proper in 1956 was 110,000.

This number was made up of vehicles engaged in the following types of operations, in the following proportions:

ALBERTA - TRANSPORTATION AND COMMUNICATIONS



'FOR HIRE' TRUCKS REGISTERED IN ALBERTA VOLUME OF INTERPROVINCIAL AND INTERNATIONAL TRAFFIC, 1956

Figures represent thousands of tons



SOURCE: Dominion Bureau of Statistics Motor Transport Traffic Statistics.



DISTRIBUTION OF TRUCKS REGISTERED IN ALBERTA IN 1956

Type	Percentage	Definition
Private Vehicles		
Farm trucks - - - - -	58	Owned and operated by farmers primarily to transport farm produce, farm supplies, and for service purposes.
Intercity trucks - - - - -	26	Owned and operated on inter-city routes by business, industry and individuals to transport their own raw materials, finished goods and merchandise.
Urban trucks - - - - -	8	Operated primarily within urban areas.
'For Hire' Trucks		
All types - - - - -	8	Operated for compensation or gain anywhere in the province according to license.

There are certain restrictions of entry into the 'for hire' motor carrier business in Alberta. The Province of Alberta has a reciprocal licensing agreement with the various states and some of the other provinces. In Table V, details are given of traffic performance by (a) all trucks registered, and (b) 'for hire' vehicles only.

Roads in Alberta are classified, permitting operation of trucks up to 62,000 pounds gross weight. The limit on overall length of combination units is 50 feet, with a maximum height of 13 feet six inches and a maximum width of eight feet. Single units are limited in length to 35 feet. During the spring thaw road bans are imposed on unpaved highways, but during the winter months trucking operations continue on their normal scale.

'For hire' truck service is available to most communities in Alberta. Numerous new truck depots were licensed during 1955 and 1956; at October 1, 1957, the 42 truck depots in the province were distributed as follows:

Calgary	10
Edmonton	10
Lethbridge	10
Medicine Hat	7
Red Deer	2
Stettler	1
Grande Prairie	2

Over 80 per cent of the 'for hire' carriers of Alberta are members of the Alberta Motor Transport Association. While there are no statutory rate regulations in force in the province, members of the Association base their charges on the Alberta Shipper's Guide published by that body. The Guide contains a comprehensive schedule of general freight rates within Alberta, rates for special commodities, contract hauling operations, haulage to destinations in other provinces, the Yukon and the Northwest Territories, and city cartage. A number of specimen rates are reproduced in Table VI.

TABLE V

PERFORMANCE BY TRUCKS REGISTERED IN ALBERTA, 1956

(Including all trips, i.e. intraprovincial, interprovincial, extraprovincial and international runs)

	All Trucks Registered	'For Hire' Carriers
Total distance travelled - - - - - miles	720,471,000	177,611,000
Average distance travelled per truck - - - - - miles	6,500	19,100
Average journey per ton of load - - - - - miles	28.6	49.8
Portion of total mileage travelled empty - - - - - per cent	51.3	36.1
Total volume of goods carried - - - - - tons	45,967,000	19,210,000
Average load per one-way trip (excluding trips by empty vehicles) - - - - - tons	3.7	8.4
Total performance - - - - - ton miles	1,314,550,000	959,176,000
Average performance per truck - - - - - ton miles	11,900	13,300

**REVENUE FROM ALL OPERATIONS PERFORMED BY
'FOR HIRE' CARRIERS REGISTERED IN ALBERTA, 1956**

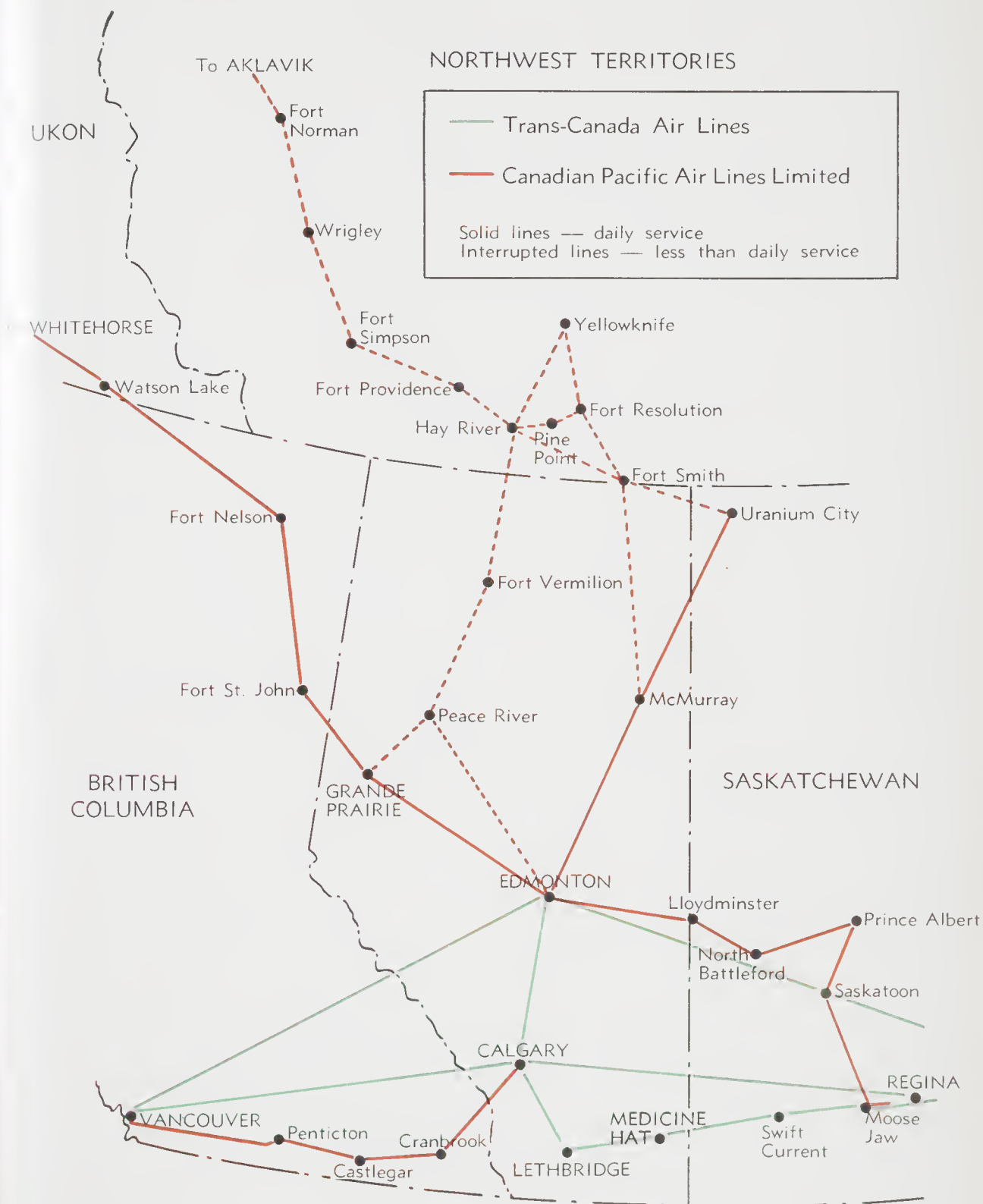
Total revenue - - - - - dollars	66,907,000
Average revenue per ton mile - - - - - cents	7.0
Average revenue per mile - - - - - cents	37.7
Average yearly revenue per truck - - - - - dollars	7,200

TABLE VI

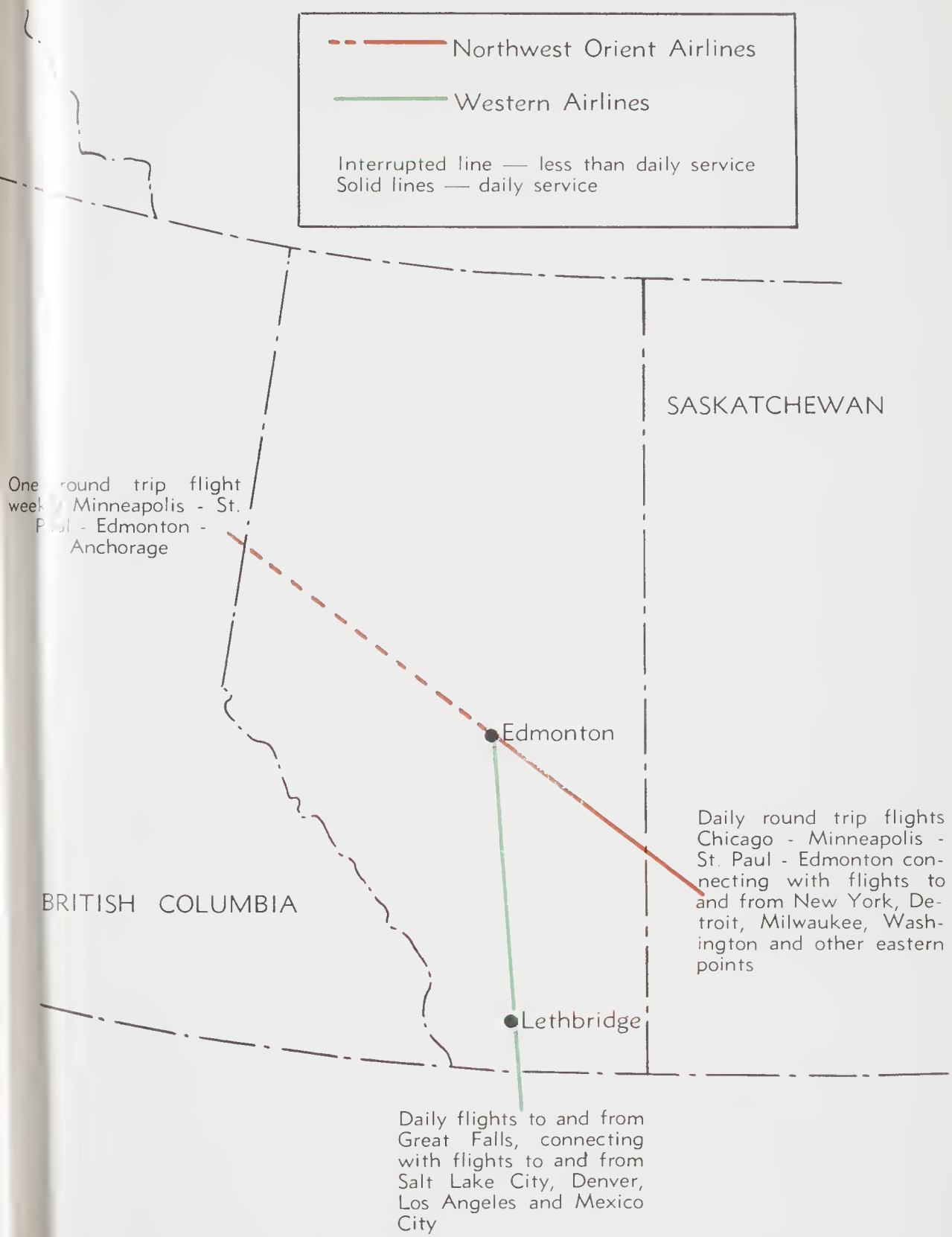
SPECIMEN TRUCK FREIGHT COMMODITY RATES, ALBERTA

COMMODITY	From	To	Rate (per 100 pounds)
Canned Goods - - - - -	Lethbridge	Calgary	\$0.3
	Lethbridge	Edmonton	0.4
Fresh Vegetables - - - - -	Lethbridge	Calgary	0.4
Packing House Products - - - - -	Edmonton	Calgary	0.6
	(or reverse; 5,001-10,000 pounds)		
	Edmonton	Medicine Hat	1.4
Agricultural Implements, Parts, Tractors - - - - -	200 to 209 miles		0.9
Building Paper, Roofing Material - - - - -	Edmonton	Medicine Hat	0.72
	(20,000 pounds and over)		
Cast Iron Pipe - - - - -	Edmonton	Calgary	0.40
	(20,000 pound lots)		
Glycol, Anti-freeze, Brake Fluid, 2, 4-D - - - - -	Edmonton	Calgary	0.40
	(20,000 pound lots)		

AIR SERVICES IN ALBERTA – CANADIAN CARRIERS



AIR SERVICES IN ALBERTA – UNITED STATES CARRIERS



Air Transportation

Air transportation has played two particularly important roles in the development of Alberta. First, air travel has brought the major centres of the west within hours, rather than days, of the West. Second, air travel and air freight have been important factors in the exploration and opening up of northern Canada.

Airports

Alberta has 21 airports and five seaplane bases.* Edmonton and Calgary airports handle large volumes of traffic. The take-off and landing figures for 1955, reproduced in Table VII, illustrate the great importance of Edmonton as an airport for all types of civilian flying traffic. Data on air freight moved through Edmonton are not available, but Calgary handled 2,445,000 pounds of freight (including mail) during 1956.

The approximate time taken by passenger flights from Calgary or Edmonton is 2 1/2 hours to Vancouver, 6 hours to Toronto, and 8 1/2 hours to Montreal. According to Trans-Canada Air Lines'

submission to the Royal Commission on Canada's Economic Prospects, greatly reduced air travel times may be expected over the next decade. It may be predicted that by 1965, scheduled flying times from Calgary or Edmonton will be 1 3/4 hours to Vancouver, 4 1/4 hours to Toronto and 5 hours to Montreal.

The bulk of air cargo is flown on non-scheduled flights of chartered commercial, or consignees' private aircraft. The relatively high cost of air carriage, which elsewhere normally restricts it to products of high intrinsic value, is not a primary consideration in the delivery of goods in northern areas where no other forms of rapid transportation are available. The role of the bush pilots, apart from carrying freight and mail to mining camps, includes mapping, photographing, flying prospectors and trappers, and performing missions of mercy.

Water Transportation

Navigation of commercial importance in Alberta is restricted to the northern waterways system. Shipping starts at the end of steel at Waterways, three miles south of McMurray. The system in-

TABLE VII

TAKE-OFFS AND LANDINGS AT CALGARY AND EDMONTON, 1955

(Average per day)

	CALGARY				EDMONTON			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Scheduled	- - 30	34	40	41	65	79	76	79
Non-Scheduled:								
Itinerant	- - 22	22	40	40	42	49	82	58
Local	- - 58	62	93	84	297	342	706	397
Military	- - 42	58	74	68	16	24	15	19
	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —
Total	- - - 152	176	247	233	420	494	879	553

* A full description of all airports in Alberta is given in Volume I of the Canada Air Pilot. (Surveyor General, Department of Mines and Technical Surveys, Ottawa; \$5.00 per copy.)

cludes the Athabasca, Lake Athabasca, Slave River, Great Slave Lake, Great Bear River, Great Bear Lake, and the Mackenzie; it comprises 2,500 miles of inland water route, and navigation continues 150 miles east and west of the mouth of the Mackenzie, in the Arctic Ocean.

Freight is carried on barges of up to 1,000 tons' capacity, pushed by small, high-powered diesel units. Capital expenditures made in the last ten years by northern water carriers for plant and equipment total \$13,366,000.

The rivers and lakes of the Mackenzie River System are divided into four areas by nature and equipment requirements.

Area No. 1: The first area is the Athabasca River, Lake Athabasca and Slave River, commencing at Waterways, Alberta, and terminating at Fort Fitzgerald, Alberta. From Waterways, the Athabasca River is navigable to Lake Athabasca, a distance of 180 miles. The delta of the Athabasca River is a junction point. Freight destined for points in the Northwest Territories continues across the west end of Lake Athabasca, enters the Slave River, and continues down the Slave River to Fort Fitzgerald, Alberta, a total distance of 302 miles from Waterways. At Fort Fitzgerald all northbound cargo must be unloaded and transported over a 16-mile portage to Fort Smith, Northwest Territories, or a 25-mile portage to Bell Rock, Northwest Territories, and then reloaded for forwarding. Cargoes destined for points on Lake Athabasca such as Uranium City, Bushell, etc., travel east from the Athabasca River delta on Lake Athabasca to their destination, an average of 92 miles of lake travel.

Area No. 2: The second geographical area is that of the Lower Slave River, Great Slave Lake and the Mackenzie River to the Arctic Coast. Cargoes destined for points in the Northwest Territories are reloaded at Fort Smith or Bell Rock on the Slave River and continue down the Slave to its delta at Great Slave Lake, a distance of 180 miles. From the Slave River delta to Yellowknife it is 91 miles over Great Slave Lake, and from the Slave River delta to the Mackenzie River the distance is 104 miles. The Mackenzie then provides a navigable channel, punctuated by four fast boulder strewn rapids, through to the Arctic Ocean at Tuktoyaktuk or Port Brabant, a distance of 1,088

miles. Tuktoyaktuk is located just off the delta of the Mackenzie River and lies in Arctic waters.

Cargoes for this area originate at two points:

1. From Grimshaw, Alberta, via the Mackenzie Highway to Hay River on the south shore of Great Slave Lake and north from that point.
2. From Waterways, Alberta, north via Fort Smith.

Distances by water from Hay River on the south shore of Great Slave Lake are far less than those from Waterways. From Hay River to Yellowknife it is 126 miles across the lake and from Hay River to Tuktoyaktuk it is a distance of 111 miles.

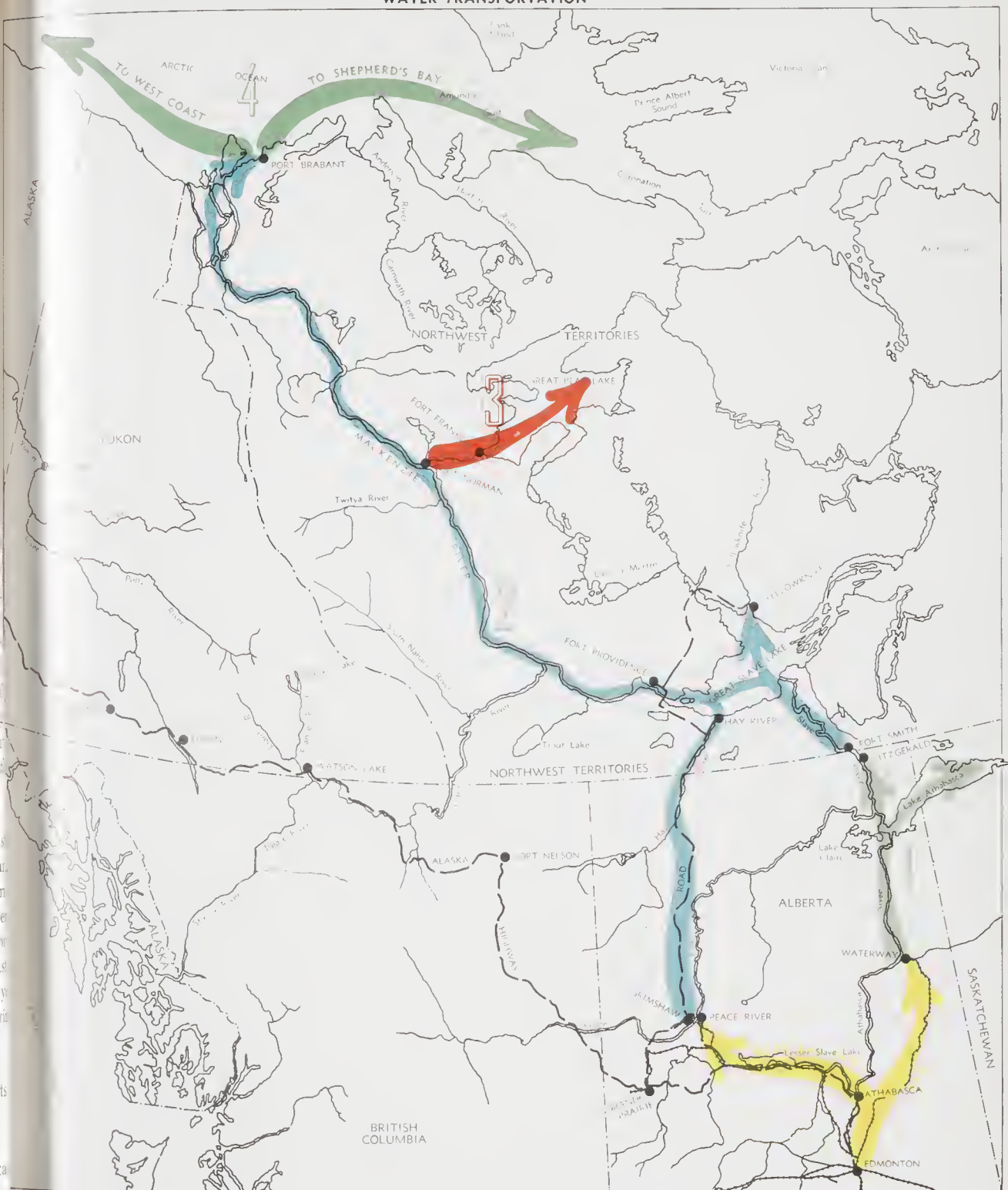
Area No. 3: The third area is that of Great Bear Lake and the Bear River. This area commences at Fort Norman, which lies at the junction of the Bear River and the Mackenzie River. Cargo is carried up the Bear River in small shallow draft equipment, portaged at the rapids on the Bear River and again placed on barges to the head of the Bear River at Fort Franklin on Great Bear Lake and to the east shore. Northbound water routes for this area can originate from Waterways, Alberta, or Hay River, Northwest Territories, through the Peace River district.

Area No. 4: This area is the Arctic coast region from Port Brabant or Tuktoyaktuk and cargo is trans-shipped to coastal boats and can be carried to all points on the Arctic Coast east to Shepherd Bay, approximately 1,200 miles, or west to all points on the Canadian Arctic Coast. The Arctic Coast is accessible for approximately two months each year from West Coast ports such as Vancouver, Prince Rupert and Victoria.

Official mileages between principal points in these areas are shown in Table VIII.

The territories served by water transportation extend from the 56th to the 70th latitude, and consequently the seasons play an important part in operations. As a general rule shipping out of Waterways commences the middle of May. Shipping originating at Waterways, Alberta, or Hay River, Northwest Territories, for Mackenzie River

WATER TRANSPORTATION



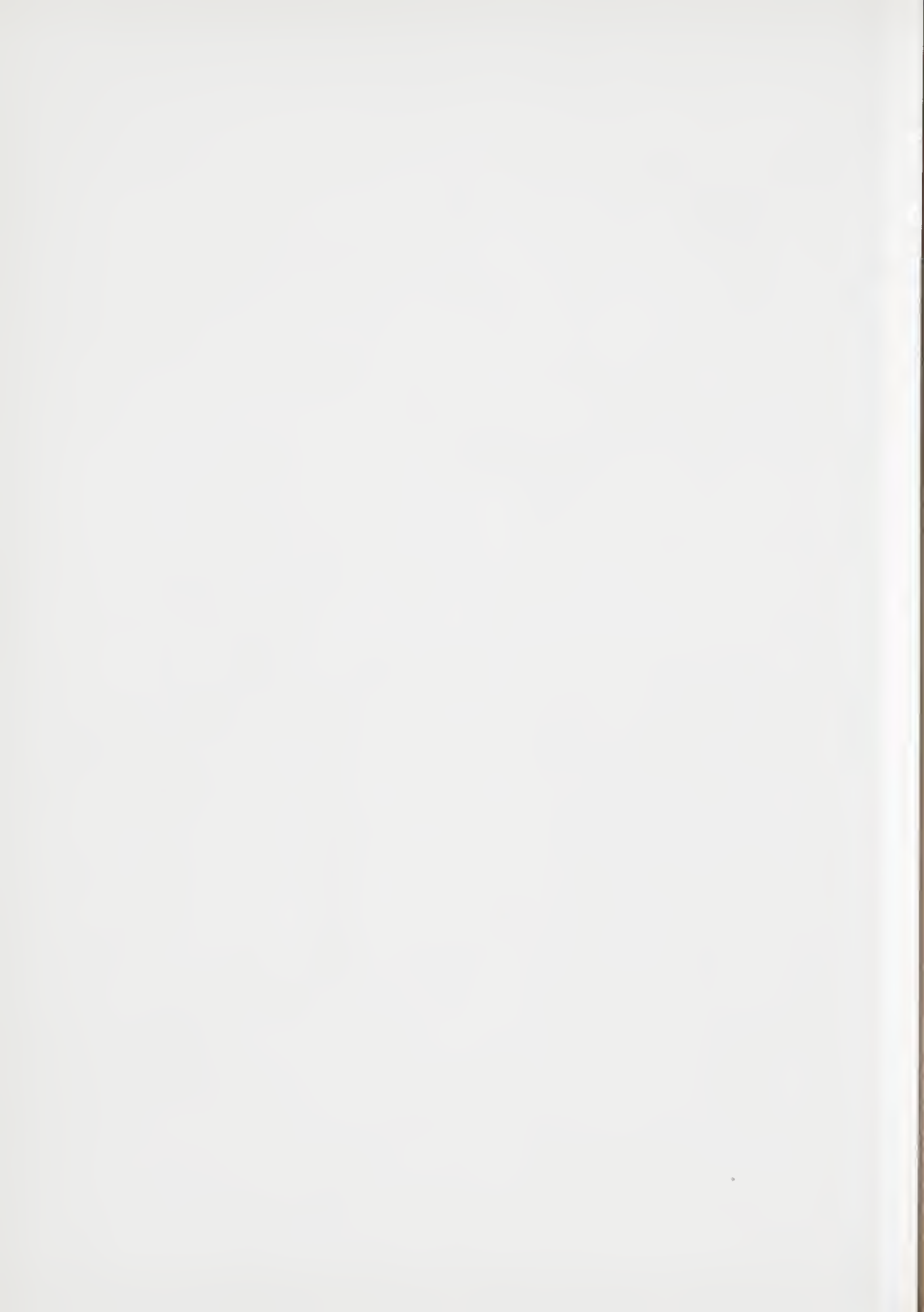


TABLE VIII

MILEAGES BETWEEN PRINCIPAL POINTS—MACKENZIE RIVER SYSTEM

	Aklavik	Beaverlodge Lake	Fort Fitzgerald	Fort Norman	Fort Rae	Goldfields	Hay River	Port Radium	Waterways	Yellowknife
Aklavik - - - - -	-	1,515	1,291	485	1,174	1,507	1,025	732	1,593	1,129
Beaverlodge Lake - - - - -	1,515	-	224	1,030	555	12	503	1,277	297	503
Fort Fitzgerald - - - - -	1,291	224	-	806	331	216	279	1,053	302	279
Fort Norman - - - - -	485	1,030	806	-	689	1,022	540	247	1,108	644
Fort Rae - - - - -	1,174	555	331	689	-	547	171	936	633	82
Goldfields - - - - -	1,507	12	216	1,022	547	-	495	1,269	289	495
Hay River - - - - -	1,025	503	279	540	171	495	-	787	581	126
Port Radium - - - - -	732	1,277	1,053	247	936	1,269	787	-	1,355	891
Waterways - - - - -	1,593	297	302	1,108	633	289	581	1,355	-	581
Yellowknife - - - - -	1,129	503	279	644	82	495	126	891	581	-

Arctic points are subject to ice conditions on Great Slave Lake. Navigation on Great Slave Lake usually commences between June 7th and 15th. Great Bear Lake cannot be crossed until the middle of July. Similarly, the close of navigation varies from October 1st to 10th in the north to October 15th to 30th in the south. The longest period of navigation is on the Athabasca and Slave Rivers, and extends for a period of some five months, while along the Arctic Coast the maximum season may be as short as 60 days.

Approximately 93 per cent of all freight delivered in the north is carried by water transport. The volume of freight moved has increased tremendously. In 1938, a maximum of 10,000 tons was carried to all points; the corresponding volume in 1956 was a total of approximately 192,000 tons. Of this tonnage, approximately 115,772 tons was carried to points within Area 1. The balance of 76,228 tons was carried to and within the Northwest Territories. Of this tonnage, it is interesting to note that 38,000 tons, representing 50 per cent of all water movement within the Northwest Territories, originated at Hay River, Northwest Territories, and internally within the Northwest Territories. The Mackenzie Highway with its connections with the Northern Alberta Railways from Grimshaw, Alberta, to Hay River, Northwest

Territories, was completed in 1948 and now carries 50 per cent of all water movements to the Northwest Territories. The total tonnage figures above do not include freight moved along the Arctic Coast. This freight was moved primarily by the American Government to D.E.W. Line points.

Of the 192,000 tons of freight moved in the north by water during the 1956 season, 176,880 tons or 92 per cent was northbound. Only 15,120 tons was southbound, and thus back haul traffic represents only eight per cent of the total freight.

The increased volume of freight has resulted in a reduction of 33.1 per cent in Class 5 or general merchandise rates over the last ten years. Increasing operating expenses, wages and equipment construction costs are likely to result in future increases in tariff rates rather than further reductions.

All common carriers engaged in the movement of goods by water are controlled as to rates and practices by the Board of Transport Commissioners of Canada and operate under published tariffs. Rates for freight movements originating from Northern Alberta Railways terminal points of Waterways and Grimshaw, Alberta, to Mackenzie points are competitive. For example:

Origination					Via	Destination	General Merchandise Rate Per Ton	Class 5 Per Cwt.
Grimshaw	-	-	-	-	Truck	Hay River	\$28.80	\$1.44
Hay River	-	-	-	-	Water	Fort Good Hope	\$31.40	\$1.57
							-----	-----
							\$60.20	\$3.01
							-----	-----
Waterways	-	-	-	-	Water	Fort Good Hope	\$60.20	\$3.01

Further specimen rates are as follows:

	Cents (per 100 pounds)
Class 5 (general merchandise rate)	
From Waterways to—	
Bushell	100
Hay River, Yellowknife	175
Norman Wells	273
Bear River Rapids	336
Aklavik-E3	374

Oil (northbound)	
From Waterways to—	
Bushell, Gunnar Docks	45
Fort Smith	75
Yellowknife	115

The Mackenzie River Transport, a division of the Hudson's Bay Company, is the oldest water transportation company in the Northwest Ter

rites. In 1935 Northern Transportation Company was formed as a wholly-owned subsidiary of the Colorado Mines, and in 1938 the Yellowknife Transportation Company Ltd., a private company, entered the field. The McInnis Products Corporation Ltd. operates transport out of Waterways into the Lake Athabasca area and Fort Fitzgerald, Alberta, and to Great Slave Lake and Slave River. Of these companies, only Northern Transportation and Yellowknife Transportation are common carriers.

Northern Transportation carries virtually all freight moving from Waterways to Lake Athabasca and is moving during the 1956 season 112,000 tons of freight as compared with 6,500 tons moved by McInnis Products. Total freight carried by common carriers within the Mackenzie River System in 1956 was as follows:

Yellowknife Transportation Company Limited,
100 tons.

Northern Transportation Company Limited,
100 tons.

Pipelines

For the volume movement of oil, pipeline transportation is cheaper than other methods of overland transportation. The direct route taken by pipelines between producing and consuming centres, their year-round operation, the absence of back haul transportation costs, manpower savings effected by automatic pumping processes, and low maintenance costs all contribute to this low cost. Competition to oil pipelines is restricted to ocean transportation, which can operate at a cost as low as 0.1 cents per ton mile. Gas pipelines, at present, are immune from competition although liquefaction of natural gas and subsequent transportation by ocean tankers is being studied.

Recent rates for pipeline movement were as follows:

	Cents per Barrel
From Edmonton to—	
Vancouver	40
Puget Sound	42.5
Regina	23.5

Gretna	36
Superior	44
Sarnia	64
Toronto	72

On October 31, 1957, there were in service in Alberta 1,340 miles of oil trunk lines and 700 miles of field gathering lines. The trunk lines include transmission lines between oil fields and refineries, feeder lines for the two cross-country systems, and the Alberta sections of these trunk systems.

The Interprovincial Pipe Line Company's system runs from Edmonton to Toronto, Ontario, a distance of 1,931 miles. The original line was 18 inches in diameter to Regina and 24 inches to Gretna, Manitoba, 18 inches traversing North Dakota and Minnesota and 30 inches from Superior, Wisconsin, across Mackinac Straits, Michigan, to Sarnia, Ontario. Running parallel to the original line are a 455-mile 24-inch loop line in Canada and a 196-mile loop 26 inches in diameter in the United States.

The system supplies oil by direct outlets or via spur lines to refineries at Saskatoon, Moose Jaw and Regina in Saskatchewan, Brandon and Winnipeg in Manitoba, Wrenshall in Minnesota, Superior in Wisconsin, and Sarnia in Ontario. From Sarnia, a 151-mile 20-inch extension of the line to Toronto was completed in the fall of 1957. It is planned to construct 112 miles of 30-inch loop line between Regina and Sarnia. The line, in addition to moving Alberta oil, carries Saskatchewan crude from the Swift Current area to St. Paul, Minnesota, and southeastern Saskatchewan oil via Westspur Pipe Line.

Trans Mountain Oil Pipe Line Company operates 718 miles of 24-inch main line from Edmonton to Vancouver, plus 62 miles of branch lines in northwestern Washington State. It serves two refineries in the United States, three near Vancouver, and one at Kamloops; these have a combined capacity of 158,000 barrels per day. Present capacity of the original line is 240,000 barrels per day; further line looping could boost this to more than 300,000 barrels per day.

There are two main gas pipeline systems serving the domestic market in Alberta. Northwestern Utilities Limited supplies gas to Edmonton and

most towns north of Red Deer. Canadian Western Natural Gas Company Limited serves Calgary and southern Alberta. Together, the two pipeline systems can meet daily demands of 500 million cubic feet. Other companies supplying regional markets by pipeline are Southern Alberta Pipelines Limited, which serves the Medicine Hat area; North Canadian Oils Limited which operates a line running parallel to Highway No. 16 from Wabamun to Hinton, and two companies in the Peace River-Grande Prairie area. Pipelines have now made natural gas readily available at most potential industrial locations in Alberta.

Alberta Gas Trunk Line Company Ltd. is building a 550-mile gas gathering grid in Southern Alberta which feeds into the Trans-Canada pipeline at the Saskatchewan border. Additional lines will be built to feed other pipelines when constructed.

The Trans-Canada system will, on completion in the spring of 1958, extend to Montreal via Regina, Winnipeg, the Lakehead, Timmins and Toronto—a distance of 2,294 miles. Its diameter is 34 inches to Winnipeg, 20 inches to Toronto, and 20-30 inches to Montreal. It is expected to have a Canadian market of 270 million cubic feet daily, initially, increasing to 650 million cubic feet daily by 1962. The pipeline will have a spur from Winnipeg to Emerson on the North Dakota border, an extension of which into the United States is planned, subject to Canadian and United States approval of gas exports and imports respectively. If this approval is obtained, the daily demand will be increased by more than 200 million cubic feet, making likely movement by Trans-Canada of one billion cubic feet of gas daily by 1963. A spur to Sarnia has also been planned.

The Westcoast Transmission line completed in October, 1957, is fed by a grid in the Peace River district. The pipeline is 688 miles long, 30 inches in diameter, and follows the course of the Fraser River to the Vancouver area. It will supply the inland regions of British Columbia as far west as Trail and Nelson via Inland Natural Gas Company Limited, which is building a 875-mile pipeline from 12 to 6 inches in diameter. The Westcoast Transmission line has an initial capacity of 400 million cubic feet daily, which may subsequently be increased to 600 million cubic feet by means of additional compressor stations. The company hopes to tie in its operations within two years to a gathering

grid in the Foothills region, to be operated by Alberta Gas Trunk Line Company Ltd. It also plans to construct a 174-mile 30-inch natural gas line from Savanna Creek, in southern Alberta, to join the Pacific Northwest Pipeline system in Idaho. A project to create a link with Pacific Gas and Electric Company for supplying natural gas to California is also in view. All extensions of the system into the United States will require approval by the Canadian and United States governments.

Communications

The telephone systems in all Alberta urban centres except Edmonton are owned and operated by Alberta Government Telephones. The Edmonton system is city-owned. There are some 850 mutual telephone companies which provide telephone service in rural areas on a co-operative basis. Of the 248,300 telephones in operation in 1955, 148,500 (60 per cent) were operated by the province, 73,000 (29 per cent) by the City of Edmonton and 26,800 (11 per cent) by mutual companies.

Compared to Canadian ratios of 18.7 residential and 26.6 total telephones per 100 persons in 1955, Alberta installations were as follows:

	Telephones per 100 Population
Residential - Alberta	15.3
Total - Alberta	23.3
Total - Edmonton	34.9
Total - Calgary	43.8

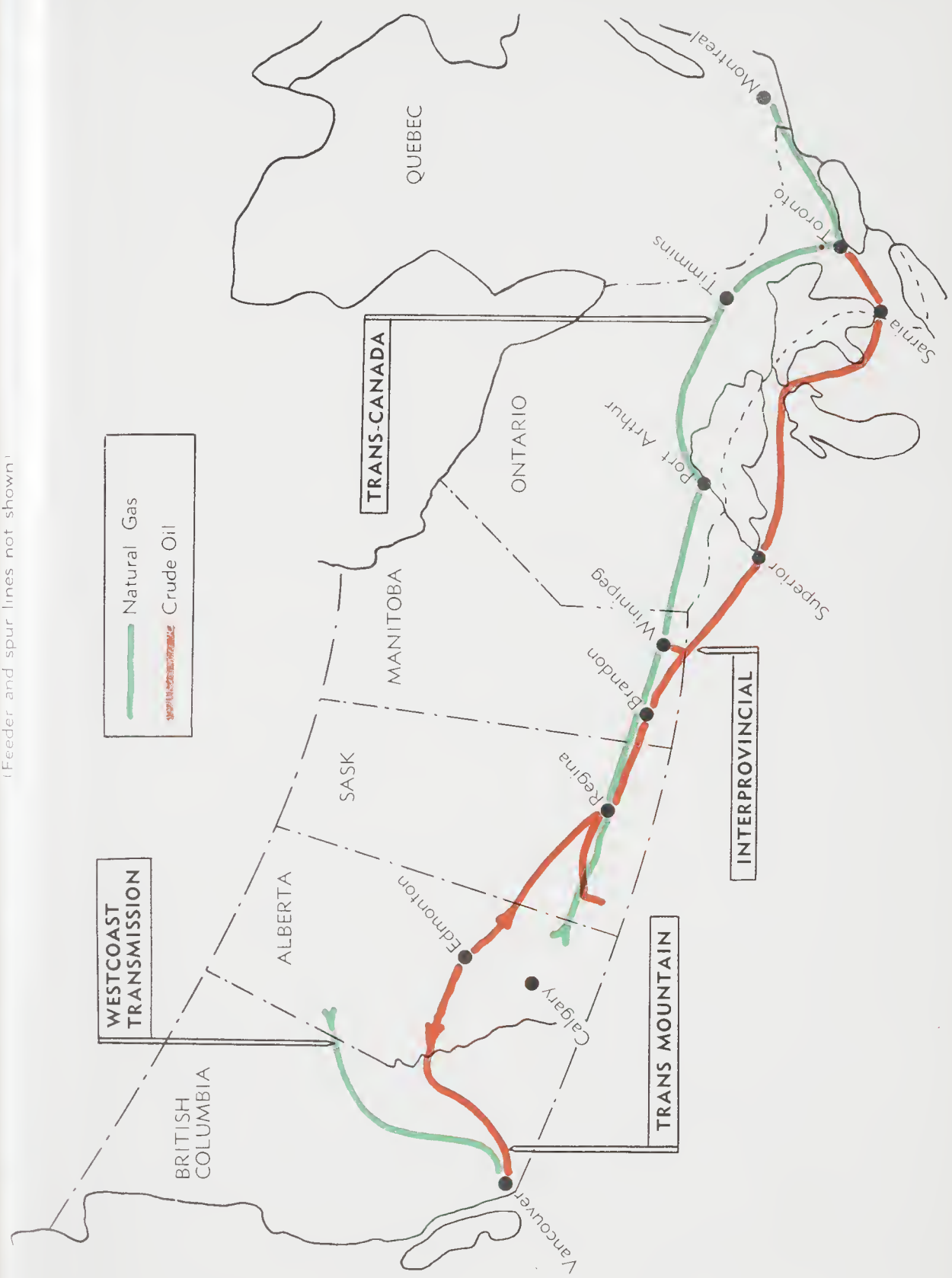
In both Alberta and Canada 74 per cent of telephones were on automatic switchboards.

The proportion of long distance calls to total calls is greater in Alberta than elsewhere in Canada. In 1955, 44 per cent of all telephone revenue in Alberta was derived from long distance call charges. In the first quarter of 1957, subscribers in Calgary were billed with an average of 162,125 long distance calls per month—more than twice the figure for either Toronto or Montreal.

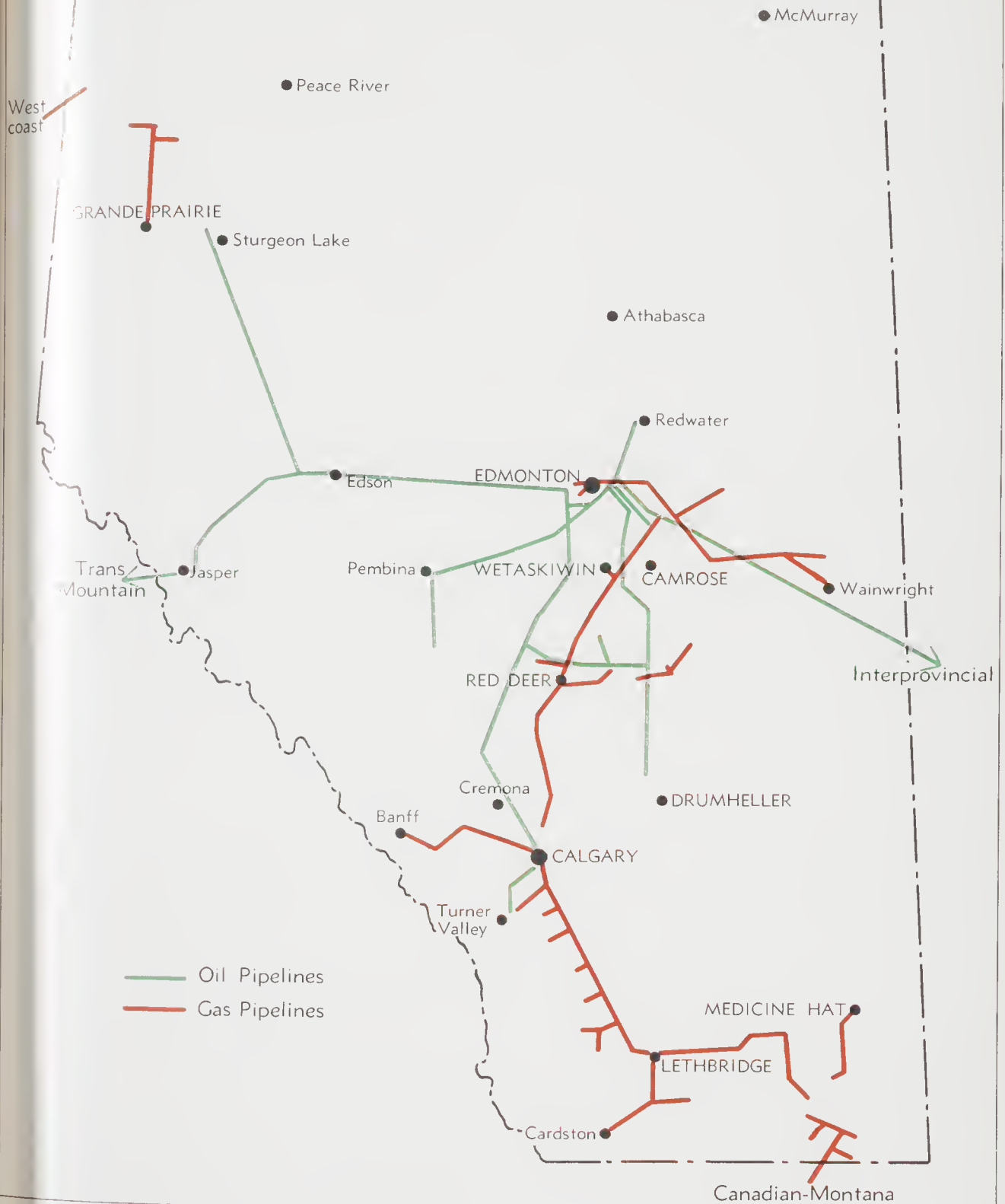
Telegraph systems operating in Alberta are Canadian National Telegraphs, Canadian Pacific Telegraphs, Northern Alberta Railways Company Telegraphs, Northwest Communication System and the Dominion Government Telegraph Service. There is a comprehensive network of telegraph

PRINCIPAL TRUNK PIPELINES ORIGINATING IN ALBERTA

(Feeder and spur lines not shown)



MAJOR OIL AND GAS PIPELINES IN ALBERTA



line along the railway lines, and service to the Territories and Alaska. In 1955 there were 453 telephone offices, 6,554 miles of pole line and 51,500 miles of telegraph wire. The number of messages exchanged totaled 1.6 million.

There are 16 radio stations in Alberta, seven at Edmonton, three at Calgary, and one each at Lethbridge, Medicine Hat, Red Deer, Camrose, Grande Prairie and Peace River. All stations accept advertising with the exception of station CKUA at Edmonton which is operated by the Provincial Government. Alberta's most powerful station CBX, which transmits at 50,000 watts from Lacombe, is operated by the Canadian Broadcasting Corporation. One Edmonton station broadcasts in French and another operates on both ultrashort (frequency modulated) and short waves.

There are five television stations with transmitters at Edmonton, Calgary, Lethbridge, Red Deer and Medicine Hat. The existing stations have been linked by microwave with the Canadian Broadcasting Corporation's cross Canada television network.

There are more than 1,100 post offices in Alberta. First class mail addressed to Canadian destinations is automatically sent by air where time is saved by this method. Mail posted at Calgary or Edmonton before six p.m. should arrive at the times shown below at selected destinations:

Destination	Time of Arrival
Montreal	3:10 p.m. day following
Toronto	11:30 a.m. day following
Winnipeg	5:40 a.m. day following
Vancouver	9:00 a.m. day following

Chicago (by air)	2:20 p.m. day following
New York (by air)	5:35 p.m. day following
Chicago (by rail)	Third morning following
New York (by rail)	Fourth morning following

The press of Alberta comprises 115 newspapers and periodicals, with the following frequency of publication:

Daily	5
Twice per week	2
Weekly	92
Twice per month	1
Monthly	15

The dailies are evening papers, except for the Calgary Albertan which appears each morning. Their net paid circulation on weekdays for the six months ending March 31, 1957, was:

Calgary Albertan	37,509
Calgary Herald	63,362
Edmonton Journal	100,874
Lethbridge Herald	16,781
Medicine Hat News	5,985

The weekly newspapers include one French and one Ukrainian language publication. The Daily Oil Bulletin, published at Calgary, commands especial interest as a newsletter circulating to subscribers throughout North America.

GOVERNMENT AND INDUSTRY

The provinces of Canada are rather more prominent in Canadian affairs than are the individual states in United States affairs, partly because of constitutional definition and partly because there are only ten provinces. The municipalities derive their powers from the provinces and thus the regulation of municipal affairs varies somewhat from one province to another.

Undoubtedly the basic fact of importance in government-industry relationships is that Canadian governments are democratic, stable, and based on principles of individual liberty. The climate for private enterprise is favourable throughout the country. Like all governments those of Canada are playing an increasingly important role in economic affairs. While this means a measure of gov-

ernment regulation of industry, there are also many instances of augmented government services to industry and more active encouragement of industrial development. Here, stress is laid on these aspects of government-industry relations, and five topics of special interest in the field of government-industry relationships in Alberta are discussed. Table IX gives, as additional information, the addresses of provincial, federal, municipal and other agencies offering services to industry, with a description of their functions.

Industrial Development

The Government of the Province of Alberta provides a number of agencies for the assistance of industry. The Department of Economic Affairs, and in particular the Industrial Development Board, provides services designed to attract new industry to the province. The Department of Industries and Labour is interested in servicing established industry, in many cases through its Provincial Marketing Board. The Research Council of Alberta has wide interests, co-operating with university and government personnel on such projects as the soil survey of the province, the forest inventory, ground water studies and pollution problems. It also co-operates with the Technical Information Service of the National Research Council of Canada.

The Industrial Development Bank, an agency of the Federal Government, opened a Calgary office in 1956. The Bank advances funds to businesses which may find it difficult to undertake public financing. It may, after study, offer a first mortgage loan to purchase equipment or for building but not to provide working capital. The industrial development services of the Federal Government the Employment Service with local offices and the Dominion Bureau of Statistics at Ottawa can be of great help to industry.

The larger cities of Alberta have taken an active interest in industrial development and provide more complete services to new and prospective industry than do most cities in other parts of Canada. The rapid growth of Calgary and Edmonton has been greatly assisted by their provision of planned industrial districts and master zoning plan and by laws. These cities have industrial departments whose task it is to provide information on sites and facilities for any inquiring industrialist. Data on the industrial sites available in or near Alberta cities are given in some detail in Chapter IX.

The commercial banks, the railways and the utilities companies have taken an active part in fostering new developments and maintain special departments which are sources of valuable information and advice.

TABLE IX
PROVINCIAL GOVERNMENT AGENCIES OFFERING SERVICES TO INDUSTRY

<u>Agency and Address</u>	<u>Basic Functions</u>	<u>Activities</u>
Department of Industries and Labour— Provincial Government Bldg., Edmonton, Alta.	All functions pertaining to manufacture and employment of labour: The Provincial Marketing Board, The Bureau of Statistics, and the Board of Industrial Relations come under the jurisdiction of this Department.	(a) The Bureau of Statistics maintains up-to-date information on many subjects. These are based on D.B.S. statistics and provincial surveys.
Director of Industrial Development— Legislative Bldg., Edmonton, Alta.	Facilitating the development of new industry.	(a) Production and distribution of industrial surveys of various localities. (b) Industrial promotion. (c) Maintenance of technical and general information of interest to industrialists.

TABLE IX (Continued)

PROVINCIAL GOVERNMENT AGENCIES OFFERING SERVICES TO INDUSTRY

<u>Agency and Address</u>	<u>Basic Functions</u>	<u>Activities</u>
Industrial Development Board Alberta— Legislative Bldg., Edmonton, Alta.	Acts as an advisory board on industrial development.	(a) Meets as required and at least once a year. (b) Clearing house for industrial promotional ideas. (c) Membership - Cities of: Calgary, Camrose, Drumheller, Edmonton, Lethbridge, Medicine Hat, Red Deer, Wetaskiwin, and the town of Ponoka. The membership is expanded when required.
The Provincial Marketing Board and its subsidiary, Marketing Services Ltd. (Crown Corporation).— Chairman, Provincial Government Bldg., Edmonton, Alta.	(a) To encourage the industrial development of Alberta by assisting industry to utilize natural resources of the province. (b) To assist industries through the mass buying of raw materials. (c) To sponsor, manage or operate industries within Alberta for the utilization of its natural resources. (d) To assist in the distribution of Alberta made goods.	(a) Purchases items in bulk for industry and holds until actually required. Purpose is to obtain best price possible. Industry submits pertinent information prior to entering into a final agreement with the Board. Agreements can be terminated at any time by the client. (b) Keeps a careful watch on world production and marketing problems. (c) Encourages the sale of Alberta products.
Research Council of Alberta— The Director, Research Bldg., 87th Ave. and 114th St., Edmonton, Alta.	Fundamental research projects, and Technical Information Service to manufacturing industry.	(a) Undertakes studies on feasibility of possible new industries. These are available for distribution—list can be obtained on request. (b) Interested industrialists may consult the section on such matters as raw materials, market conditions, manufacturing processes, general advice, new products, substitute materials.

Note: No other province in Canada has legislation in force extending a comparable service to its citizens and industry.

TABLE IX (Continued)

PROVINCIAL GOVERNMENT AGENCIES OFFERING SERVICES TO INDUSTRY

<u>Agency and Address</u>	<u>Basic Functions</u>	<u>Activities</u>
Research Council of Alberta— The Director, Research Bldg., 87th Ave. and 114 St., Edmonton, Alta.		<p>(c) Tests of fuels and lubricants. Carries on other miscellaneous testing and research for industry on a fee basis. An new multi-million dollar research laboratory completed in 1956 will make it possible to expand this service.</p> <p>(d) Sponsors committees on various technical projects such as ground water pollution, "Trace elements", etc. Members of committee are from industry and government.</p> <p>(e) Acts as agent in all matters pertaining to exploration and investigation of the Athabasca oil sands.</p>

FEDERAL GOVERNMENT AGENCY OFFERING SERVICES TO INDUSTRY

<u>Agency and Address</u>	<u>Basic Functions</u>	<u>Activities</u>
Industrial Development Bank— Calgary.	Advancement of funds to small industries.	<p>(a) The Industrial Development Bank, controlled by the Canadian Government through the Bank of Canada, advances money to small businesses who are unable due to their size to undertake public financing profitably. After study of the business from a commercial and economic point of view, the Bank may approve a loan based on a first mortgage. Such loans are limited to purchase of equipment or buildings. Loans are not granted for working capital. Interest rates and terms can be obtained at the address given.</p>

TABLE IX (Continued)

MUNICIPAL GOVERNMENT AGENCIES OFFERING SERVICES TO INDUSTRY

three largest cities of the province, Edmonton, Calgary and Lethbridge have made special provision for industrial development activities by appointing special officers, as listed below opposite the names of these three cities. The general duties of these officers are: to promote and encourage the industrial development of the city, to have informa-

tion available on industrial sites, to assist interested persons by providing information, conducting them on tours, and assisting in dealings with various departments of the city. In other cities and towns similar duties are performed by one or another of municipal officers, as listed below.

MUNICIPALITY

Edmonton
Calgary
Lethbridge
Medicine Hat
Red Deer
Grande Prairie
Camrose
Lloydminster
Wetaskiwin
Stettler
Drumheller
Edson
Brooks
Vermilion
Peace River
Blairmore

OFFICIAL IN CHARGE OF INDUSTRIAL DEVELOPMENT

Director of Industrial Development
Co-ordinator of Industrial Development
Industrial Representative
City Controller
City Commissioner
Secretary-Treasurer
Industrial Representative
Town Clerk
Industrial Representative
Town Manager
City Manager
Secretary-Treasurer
Secretary-Treasurer
Secretary-Treasurer
Secretary-Treasurer
Secretary-Treasurer

OTHER ORGANIZATIONS OFFERING SERVICES TO INDUSTRY

AGENCY

ADDRESS

Banks:

Bank of Montreal*

Business Development Department, Main Branch,
8th Ave. & 1st St. W., Calgary, Alta.

The Manager, Main Branch,
Jasper Ave. & 101st St., Edmonton, Alta.

Bank of Nova Scotia

The Manager, Main Branch,
125 - 8th Ave. W., Calgary, Alta.

The Manager,
10050 Jasper Ave., Edmonton, Alta.

Canadian Bank of Commerce*

Business Development Department, Main Branch,
309 - 8th Ave. S.W., Calgary, Alta.

The Supervisor,
Oil and Gas Dept., Western Canada,
001 Mobil Bldg., 8th Ave. W., Calgary, Alta.

The Manager, Main Branch,
Jasper Ave. & 101st St., Edmonton, Alta.

TABLE IX (Continued)

OTHER ORGANIZATIONS OFFERING SERVICES TO INDUSTRY

<u>AGENCY</u>	<u>ADDRESS</u>
Imperial Bank of Canada	The Manager, 102 - 8th Ave. East, Calgary, Alta.
	The Manager, Main Branch, 9990 Jasper Ave., Edmonton, Alta.
Royal Bank of Canada°	Business Development Department, Main Branch, 4th St. W. & 8th Ave., Calgary, Alta.
	The Manager, Main Branch, 10023 Jasper Ave., Edmonton, Alta.
Toronto-Dominion Bank	Business Development Department, Main Branch, 114 - 8th Ave. W., Calgary, Alta.
	The Manager, 10038 Jasper Ave., Edmonton, Alta.
Managers of banks and treasury branches in all cities and towns are in a position to assist prospective industry by answering requests regarding local conditions.	
Treasury Branch, Government of Alberta	The Manager, Main Branch, Centre and 8th Ave. E., Calgary, Alta.
	The Manager, Main Branch, 9954 Jasper Ave., Edmonton, Alta.
Other:	
The Canadian Pacific Railway Company	Industrial Agent, C.P.R. Station, 9th Ave., Calgary, Alta.
The Canadian National Railways	Industrial Agent, C.N.R. Station, Edmonton, Alta.
Calgary Power Ltd.	Director of Industrial Development, 140 - 1st Ave. W., Calgary, Alta.
Canadian Western Natural Gas Co. Ltd.	Customer Sales and Service Department, 6th Ave. and 1st St. W., Calgary, Alta.
Northwestern Utilities, Ltd.	New Business Department, 10124 - 104th St., Edmonton, Alta.

Planning

Alberta is noted for her leadership in the field of community planning. Nearly every urban centre in the province has adopted a modern system of zoning and many are putting into effect long-range development plans. This work is under the guidance of trained and experienced planners working with the councils of Alberta municipalities as part of the normal process of local government.

Edmonton and Calgary have their own large planning departments. All the other cities, and indeed almost all of the main settled areas, obtain planning assistance from one or another of the six District Planning Commissions in the province. The professional planning done by these organizations is supplemented by similar work done by the Town and Rural Planning Section of the Department of Municipal Affairs, which is responsible for province-wide planning policies and for detailed planning in more remote areas and in new towns of the province.

The Royal Commission on the Metropolitan Development of Calgary and Edmonton, whose report was published by the Queen's Printer, Edmonton in 1956, made a very careful study of the planning that has been done in these two metropolitan areas of the province. The present planning machinery in these areas may be summarized as follows:

- (1) There is a city planning department, comprising the technical planners and draughtsmen, headed by the city planner.

- (2) There is a technical planning board, a body composed of councillors and senior officials of the city. This board must prepare the general plan for the city and see that it is implemented.

- (3) There is a further group to which appeals can be made, and which may act as an advisory group to the City Council.

- (4) Finally there is the provincial Planning Advisory Board, consisting of a chairman appointed by the province and other senior officials of the

government, including the Director of Town and Rural Planning, which acts as the board of final appeal.

There are also various advisory committees. Calgary has two, one on thoroughfares, and one on zoning. Edmonton has an architectural panel which approves, for example, the position of houses on lots.

Pollution of Air and Water

The Department of Public Health of the Province of Alberta is the government agency dealing with water and air pollution. The Department is assisted by a number of technical committees made up of members from industry, the Research Council of Alberta, and the University of Alberta.

The Provincial Board of Health, functioning under authority of the Public Health Act, conducts stream surveys and sets water and waste effluent qualities. This Board works closely with established industry in solving problems of both air and water pollution. The Department of Public Health is prepared to discuss any pollution problems with industries contemplating industrial plants in Alberta.

Provincial Labour Legislation

Alberta labour legislation is administered by the Department of Industries and Labour and by the Board of Industrial Relations. Minimum wages and maximum hours of work have been established, except for farm labourers and domestic servants; vacations with pay and one day's rest in seven are provided; child labour is limited. It is an offence to seek to compel any person to join or refrain from joining an employees' organization. Every such organization must file a copy of its constitution and an annual list of its officers, and the Minister of Industries and Labour may demand a statement of the organization's receipts and expenditures. Employees may elect a bargaining agent which may be certified. Provision is made for conciliation of disputes. Agricultural labour is not subject to these regulations.

GOVERNMENT FINANCE

The Federal Government handles much more money than all other governments in Canada combined. The Federal Government collected 75 per cent of all taxes in 1953; when revenues other than taxes are added, the Federal Government's share of total receipts was 70 per cent. However, the Federal Government paid \$341 million of these receipts to provincial governments in that year, and when an adjustment is made to allow for these transfer payments, it is seen that the Federal Government actually used 66 per cent of receipts by all governments.

The main sources of income for the Federal Government are income taxes (corporation and personal), sales taxes, import taxes, and excise taxes on tobacco and liquor. The major income sources of the provincial governments are corporations, gasoline, liquor and sales taxes, while other revenue sources important to them are motor vehicle licences and income from the public domain. After transfer payments they receive about 22 per cent of all revenues. Municipalities, which lean heavily upon property taxes, in 1953 collected about fourteen per cent of all taxes, up from eleven per cent in 1951.

The largest single item of Federal expenditure is that for national defence, while other large items in the budget include old age pensions, family allowances, and veterans' care. All levels of government expend revenues on health, education and transportation. All levels of government must meet debt charges, though these are of varying weight. The debt charges of the Federal Government are 11 per cent of its total expenditures, while the percentage is 4 for provincial governments and 4.6 for municipalities. All of these percentages have decreased in recent years.

The debt of the Federal Government, mainly incurred in time of war, greatly exceeds Provincial and Municipal debt. Net Federal debt has, however, been reduced from a peak of \$1,092 per capita in 1946 to \$732 per capita in 1954 as a result of government budget surpluses and growing population. The real burden of this debt has fallen even further because prices and incomes have risen considerably during this period.

Table X gives the bonded debt of each province in 1953 and 1957 the bonded debt per capita of each

province, and the average coupon rate paid on this debt. Alberta has the lowest coupon rate of any province, and the lowest debt per capita of any province except Newfoundland, whose debts were assumed by the Federal Government in 1949. In addition, Alberta's debt has been decreasing in recent years, while debts of other provinces have been increasing (except British Columbia since 1951).

By way of contrast, in 1941 Alberta paid the highest average coupon rate, 4.88 per cent, and the per capita debt (\$161) was well above the average for all provincial debts (\$149), though not the highest in the country. The Prairie Provinces suffered particularly during the economic difficulties of the 1930's and the Alberta Government then felt itself forced to reduce its interest payments; this adversely affected its position in the capital markets for a number of years. The situation is very different today.

Provincial Finance

The varying fortunes of the Province of Alberta are displayed in Table XI, which clearly indicates the stagnation of the 1930's and the growth after 1940. The Provincial Government took a firm stand on its financial policies in the middle 1930's with the result that after thirty years of deficit financing there have been twenty years of surpluses.

Another dramatic change has occurred during the 1950's, with the income from petroleum and natural gas leaping up from negligible amounts to \$42 million in 1950-51, and to \$126.3 million in 1956-57. The swift rise in economic activity has brought surpluses that are as great as total expenditures during the 1937-44 period.

Table XI reveals that a relatively small proportion of the Alberta Government's revenue comes from taxes. The large amounts received from licences, fees, and fines consist mainly of income from the exploitation of the natural resources. Revenues from trading activities, which amount to nearly as much as taxes in most years, come mainly from the Liquor Control Board, interest on advances to the government telephone system and sale of land.

TABLE X

INDEBTEDNESS OF CANADIAN PROVINCES, 1953 AND 1957

	Bonded Debt (millions of dollars)		Bonded Debt per capita (dollars)		Average Coupon Rate (per cent)
	1953	1957	1953	1957	1953
Newfoundland - -	15.0	43.0	39.2	100.9	4.27
Prince Edward Island	19.9	19.3	187.7	194.4	3.33
Nova Scotia - -	203.5	220.1	306.9	316.8	3.45
New Brunswick - -	202.0	237.0	376.9	419.5	3.78
Quebec - - -	479.0	481.7	112.2	101.2	3.37
Ontario - - -	1,012.2	1,173.0	206.7	208.6	3.56
Manitoba - - -	161.8	179.3	200.0	210.9	3.77
Saskatchewan - -	164.3	204.6	190.8	232.3	3.91
Alberta - - -	81.0	72.6	80.0	62.6	2.87 (2.85 - 1957)
British Columbia -	222.1	181.7	180.6	122.2	3.37
Totals - - -	2,560.8	281.23	173.2	196.94	3.53

Total Loans to Alberta Municipalities as at March 31st, 1957

Municipal Councils - - - \$159.2 Million

School Boards - - - \$ 47.0 Million

Three important sources of revenue are payments from the Federal Government under the Tax Rental Agreement, subsidies from the Federal Government, and revenue from public domain. Since 1947-48, Federal Government payments and subsidies have not risen greatly, but revenue from public domain has risen almost twentyfold as the result of increased receipts in the form of royalties, leases, fees and rentals from petroleum and natural gas producers. Total revenue per capita is now higher than for any other province in Canada.

The expenditures of the Provincial Government are shown in Table XII. Here can be seen what has been done with the ample funds that have recently

flowed into the Provincial Treasury. There has been a highway building program of impressive proportions, and education and public welfare have absorbed considerable amounts, as should be expected. But a most interesting item is the "Recoverable Advances and Payments under Guarantee." As part of this substantial item in 1954-55, a figure of \$35 million represents advances to municipalities for capital purposes at low interest rates. The 1958 budget speech includes substantial increases in grants. \$99 million alone will go to municipalities for hospitals and schools. Total loans to Alberta municipalities as at March 31, 1957, amounted to \$159.2 million plus \$47 million to school boards. The large cities, however, are compelled to raise money in the open market in 1958.

TABLE XI

REVENUES OF THE ALBERTA PROVINCIAL GOVERNMENT

(Millions of Dollars)

	1928-29	1930-31	1935-36	1940-41	1945-46	1950-51	1954-55	1956-57
Taxes - - - - -	4.7	4.9	5.4	9.0	13.8	15.2	24.3	27.0
Licences, Fees and Fines - - - - -	4.0	4.1	3.7	6.2	9.1	59.1	101.7	157.0
(Petroleum and Natural Gas) - - - - -	(0.2)	(0.2)	(0.2)	(0.6)	(1.0)	(41.9)	(76.8)	(126.3)
Revenue from Trading Activities and Assets - - - - -	3.6	3.1	3.3	4.2	10.7	15.3	23.7	28.5
Repayment of Loans - - - - -	3.1	0.3	1.1	0.6	1.2	5.5	9.9	10.9
Public Service Pension Act - - - - -	0.2	0.3	0.3	0.4	0.6	1.4	1.2	1.6
Transfers from Federal Government:								
Subsidies - - - - -	2.5	3.0	1.8	1.8	1.8	2.1	2.2	2.3
Canada-Alberta Tax Agreement - - - - -	0.1	-	-	-	1.5	17.3	31.8	37.1
Refunds of Expenditure - - - - -	-	-	1.2	2.8	2.8	7.8	4.9	5.3
Total, Transfers - - - - -	2.6	3.0	3.0	4.6	6.1	27.2	38.9	44.7
Other Refunds of Expenditure - - - - -	0.5	0.6	1.0	1.0	1.1	1.6	2.9	3.0
Financial Operations - - - - -	5.2	10.5	10.4	0.2	65.5	84.0	50.1	14.5
Miscellaneous - - - - -	0.1	0.1	1.7	0.2	0.2	0.8	2.1	2.0
Total Revenue - - - - -	24.0	26.9	29.9	26.4	108.3	210.1	254.8	289.2

EXPENDITURES OF THE ALBERTA PROVINCIAL GOVERNMENT

(Millions of Dollars)

	1928-29	1930-31	1935-36	1940-41	1945-46	1950-51	1954-55	1956-57
General Government Expenditure								
Legislation - - - - -	-	-	-	-	-	-	-	-
General Government - - - - -	0.2	0.4	0.4	0.2	0.2	0.3	0.3	0.4
Justice - - - - -	1.2	1.3	1.5	2.3	3.2	5.4	8.9	11.3
Miscellaneous - - - - -	1.1	1.3	0.7	0.8	0.8	1.4	3.2	4.0
	-	-	-	-	-	0.1	0.3	0.5
Total	2.5	3.0	2.6	3.3	4.2	7.2	12.7	16.2
Social Expenditure								
Education - - - - -	2.4	3.0	2.5	3.1	4.8	14.8	24.8	42.3
Public Welfare - - - - -	2.2	3.6	7.5	7.7	9.4	24.3	42.3	52.5
Total	4.6	6.6	10.0	10.8	14.2	39.1	67.1	94.8
Economic Expenditure								
Agriculture - - - - -	0.7	0.7	0.4	0.5	1.0	1.6	2.6	3.0
Public Domain and Works - - - - -	1.2	2.8	0.6	0.9	2.7	13.3	20.5	23.5
Highway - - - - -	5.9	6.3	2.6	2.6	3.5	22.5	52.6	53.0
Recoverable Advances and Payments under Guarantee - - - - -	1.4	1.8	4.8	1.4	0.7	12.6	57.1	44.7
(Municipal Capital Expenditures Act) - - - - -	-	-	-	-	-	(35.0)	(25.0)	-
Contributions to Municipalities - - - - -	0.1	0.1	0.1	0.1	0.1	0.2	0.2	-
Total	9.3	11.7	8.5	5.5	8.0	50.2	133.0	124.2
Debt Charges - - - - -	4.8	5.8	7.3	3.8	5.5	4.4	5.5	5.7
Financial Operations - - - - -	2.4	0.9	1.8	0.8	83.8	126.2	34.7	38.0
Miscellaneous - - - - -	0.1	0.5	0.1	-	-	-	-	-
Total Expenditure - - - - -	23.7	28.5	30.3	24.2	115.7	227.1	253.0	278.9

TABLE XIII

FINANCIAL STATISTICS FOR ALL ALBERTA MUNICIPAL GOVERNMENTS*

(Millions of Dollars)

	1943	1947	1952	1954	1956 (Including Counties)
Assessment - - - - -	559	659	952	1104	1328.0
Current tax levy - - - - -	17.8	28.5	51.2	61.9	71.9
Tax arrears - - - - -	33.2	23.0	22.0	26.0	28.2
Tax arrears as per cent of current tax levy	187	81	43	42	39.0

* Except counties.

TABLE XIV

FINANCIAL STATISTICS OF ALL ALBERTA CITIES

(Millions of Dollars)

	1943	1947	1952	1954	1956
Assessment - - - - -	148.9	187.8	355.8	477.1	600.0
Current tax levy - - - - -	7.8	10.3	22.1	28.8	35.0
Tax arrears - - - - -	12.0	7.8	7.4	7.6	7.6
Tax arrears as per cent of current tax levy	154	76	33	26	22
Debenture Debt - - - - -	39.6	29.3	72.2	114.8	158.7
Debenture Debt as per cent of assessment	27	16	20	24	26

Municipal Government

The Province of Alberta has 9 cities, 84 towns and 147 villages. There were only 13 municipalities with populations of 2,500 and over in 1951; there were only 6 municipalities with populations over 5,000, and only three over 20,000. The Edmonton and Calgary metropolitan areas contained 33 per cent of the total population of the province in 1951, a proportion which had risen from 23 per cent in 1941 and reached 40 per cent in 1956; these two cities are the most rapidly growing cities in Canada.

The Provincial Government appointed a Royal

Commission to look into the difficulties which have arisen as a result of this rapid metropolitan growth. The Commission's report was published in January, 1956. Many recommendations are made, but two general problems stand out: the problem of controlled development, for which they suggest compulsory over-all planning organizations, and the problem of financing development. The Commission believes that this financing must be accomplished with continued help from the Provincial Government.

Calgary and Edmonton have faced more severe growth problems in recent years than have other

All the municipalities. Other centres have experienced less rapid growth, and there has been a great improvement in their finances resulting from the buoyant economic conditions in Alberta during the past two decades. Tables XIII and XIV show the marked reduction in tax arrears relative to the tax levy. It must be noted, however, that the paying up of back taxes during the 1940's gave the municipalities an extra source of income which is now available, and will not be available in the future. Municipalities rely heavily on property taxes which are notoriously rigid, even perverse, in that as they tend to dry up during a business depression when municipal needs do not lessen in proportion, and respond slowly and with considerable lag in growing communities.

The two major cities have been compelled to spend so much money on the improvement and expansion of municipal facilities that their debts have increased very considerably since 1946. While Calgary's population increased by 61 per cent, net debenture debt increased more than fivefold. Over the same period, Edmonton increased its population 82 per cent, and its net debenture debt has more than doubled (see Table XV).

The Royal Commission on Metropolitan Development provided a debt comparison with other leading cities of the country for 1954: "... the gross per capita debt of Calgary was surpassed by at least four other cities (Edmonton, Halifax, Regina, Vancouver); while Edmonton was the highest of all cities listed. On the other hand, if only net debt is considered (i.e., omitting school debt, utility and local improvement debt), then Edmonton drops into third place, after Vancouver and Victoria, and Calgary follows Edmonton. If the school debt is added, then for several years Edmonton has had the highest combined debt in Canada, being of the order of \$369 in 1953, and \$425 in 1955."

Property taxes are the most important single source of revenue for Calgary and Edmonton, accounting for some 75 per cent of all taxes collected, but there are other important sources of revenue in both cities. Edmonton runs and operates its own waterworks, electric, telephone, and transit systems. The last named sometimes has deficits, but surpluses have regularly been turned over to the city by the other three. The City of Calgary also receives revenue fairly regularly from its electrical system, but less regularly from its transit system and waterworks. Provincial Government grants provide

about eight per cent of each city's revenue, comparable to the amount each receives from its utilities.

The Royal Commission on Metropolitan Development has recommended that utility rates in the two cities be raised so that the cities might derive more of their much-needed revenue from this source. The city administrations are not anxious to do this, although for example, telephone rates in Edmonton are about the lowest in the country.

The 1958 budget speech of the Provincial Treasurer gives details on the amount of provincial assistance to the two metropolitan areas of the province. Calgary will receive about \$13 million and Edmonton \$16.5 million. During the four fiscal years 1952-56, direct and indirect financial assistance amounted to nearly \$49 million. Assistance by loans at low interest rates provided an additional \$92 million during the four years 1952-56. It is estimated by the Provincial Treasurer that \$176 million will be received by the two cities over the next seven years. No low interest loans for Calgary or Edmonton are included in the budget for 1958.

All municipalities in Alberta, except the cities, are authorized to assess real property in accordance with the provisions of The Assessment Act of Alberta, and the basis to be used for assessment is set out in an Assessment Manual supplied by the Department of Municipal Affairs, compliance with which is mandatory for all assessors. A complete reassessment must be undertaken at the direction of the Minister of Municipal Affairs. Mill rates, of course, vary considerably as between municipalities.

Taxation powers of Alberta cities are set forth in The City Act. Of the eight cities, six use the level of assessment recommended in the Assessment Manual, while the remaining two, Edmonton and Calgary, utilize a higher base approximately equivalent to 1944-45 cost. General assessments must be undertaken at least every eight years. Again, as in the case of other municipalities, there is some variation in mill rates.

There has been some complaint by some manufacturing industries that their assessments have been too high, and the Alberta Legislature passed an Act in the 1957 session providing for an Assessment Equalization Board specifically for appraisal of plant installations. The Provincial Government is actively studying the situation.

TABLE XV

MUNICIPAL FINANCES—CALGARY AND EDMONTON

						Population '000	Taxable Assessment \$000,000	Mill Rate mills	Net Debenture Debt \$000,000	Net Debenture Debt per Capita \$
CALGARY										
1946	-	-	-	-	-	100	62.8	46	5.7	56.78
1948	-	-	-	-	-	105	68.8	54	4.2	40.51
1950	-	-	-	-	-	121	79.0	58.5	8.0	66.44
1952	-	-	-	-	-	138	108.0	59.25	10.5	75.57
1954	-	-	-	-	-	157	189.6	48	22.2	141.46
1955	-	-	-	-	-	169	219.6	41	28.0	165.91
1956	-	-	-	-	-	180	233.9	43	32.0	178.00
1957	-	-	-	-	-	192	261.9	47	37.0	192.00
EDMONTON										
1946	-	-	-	-	-	115	77.2	49.5	12.6	109.97
1948	-	-	-	-	-	127	90.8	49.5	12.2	96.75
1950	-	-	-	-	-	149	120.4	49.5	16.3	109.56
1952	-	-	-	-	-	169	179.3	52.5	21.3	126.09
1954	-	-	-	-	-	198	198.9	53	28.5	144.27
1955	-	-	-	-	-	209	232.3	48	31.5	150.45
1956	-	-	-	-	-	223	255.1	51	41.0	183.88
1957	-	-	-	-	-	238	272.5	54	53.7	225.55

CHAPTER IV

ELECTRIC POWER AND PRIMARY INDUSTRIES

	Page
Electric Power	131
Electric Power Facilities	131
Economics of Power Production	131
Power Generation in Alberta	132
Cost of Power	132
Future Prospects	135
Agriculture	136
Oil Resources	136
New Land	139
Irrigation	139
Agricultural Organization	140
Demand for Agricultural Products	141
Land and Labour Requirements	146
Future Alberta Agricultural Output	147
Forestry and Lumbering	147
Forest Area	147
Forest Utilization	147
Forest Losses	148
Forest Management	148
Future Utilization of the Forests	151
Mining	152
Coal	152
Other Minerals	158
Future Utilization of other minerals	162
Petroleum and Natural Gas	162
Petroleum	162
Natural Gas	168

CHARTS AND MAPS

Main Transmission Lines and Power Plants	133
Alberta Soil Zones	137
Alberta Small Grain Acreage 1908-1956	143
Alberta Livestock Numbers	143
Exploited Forest Lands	149
Production of Coal in Canada, Alberta and Nova Scotia	155
Coal Production, Imports, and Consumption in Canada	155
Production of Coal by Groups, Alberta	159
Production of Coal by Type, Alberta	159

TABLES OF INFORMATION

Table I	Power Plants in Alberta	135
Table II	Production of Important Farm Products in Canada 1975	145
Table III	Canada, Prairie Provinces and Alberta; Production of important farm products 1955 (including some estimates) and projections for 1975	146
Table IV	Typical Analyses and Calorific Value of Alberta Coal Types	153
Table V	Operating Costs and Revenue Per Ton of Marketable Coal Produced 1954 and 1956	154
Table VI	Shipments of Coal from Alberta Mines 1946 and 1956	157
Table VII	Alberta Production of Petroleum 1936 and 1957	163
Table VIII	Alberta Petroleum Production by Major Fields 1947-1957	165
Table IX	Alberta Petroleum Sales 1945-1957	166
Table X	Gross Marketed Production of Natural Gas in Alberta 1936-1957	169
Table XI	Sale of Natural Gas 1956	169

ELECTRIC POWER AND PRIMARY INDUSTRIES

ELECTRIC POWER

Four major energy sources—water power, natural gas, coal and oil—are used to produce electric power in Alberta. A pattern of use has evolved in which each energy source has taken its appropriate place in the generation of electricity. This assures Alberta's industries of low and relatively stable power rates for the future, based on virtually unlimited sources of energy generally well located to serve major centres. In contrast, Eastern Canadian industry is faced with power costs that are likely to increase much faster as new plants are established in areas where low cost power resources are fully utilized.

Alberta's fuel resources exceed those of all the rest of Canada combined. They have played a

major role in the economic development of the Province and, through export to other areas, promise to play an important part in the future development of Canada as a whole. While these resources have many applications in their primary form of coal, gas and oil, they become a much more versatile form of energy when converted into electricity. In this respect Alberta is well provided for, with an extensive network of transmission and distribution lines from the many generating plants to the industries, commercial establishments, residences and farms of the Province. Power for industrial purposes is available in the areas adjacent to the main transmission lines at rates which compare favourably with other points in Canada.

Electric Power Facilities

The location of the main transmission lines and power plants is shown on the Map Page 133. Table I lists the utilities in Alberta with their generating plant capacities. Water power represents 41 per cent of the total, steam-electric and gas-turbine plants 56 per cent, and internal combustion plants 3 per cent.

Three privately-owned and three municipal corporations supply over 99 percent of the electric power needs of the Province. The privately-owned corporations supplied 74 percent of the total energy requirements in 1957. Of this total Calgary Power Ltd. supplied 65 percent, Canadian Utilities Limited 8 percent and Northland Utilities Limited 1 percent. The municipal corporations supplied 26 percent with the City of Edmonton supplying 21 percent, the City of Medicine Hat 3 percent and the City of Lethbridge 2 percent.

Economics of Power Production

Over the years the economics of generating and transmitting electric power have changed greatly. The resulting savings from improved techniques, coupled with expanding power needs, have tended

to offset the effects of inflation, so that the cost of power has remained relatively constant. That this will continue indefinitely is, however, too much to expect.

Until 20 years or so ago the cheapest sources of electricity to be found anywhere was water power, and those areas close to favourable hydro power sites enjoyed a marked economic advantage. For example, this, and the arable land to sustain an industrial population on a high standard of living, laid the foundation for the industrialization of the Niagara area of Ontario. Today in Canada as a result of the great increase in the use of electricity, most of the favourable water power sites within reasonable transmission distance of present load centres, have already been developed.

In the meantime, much progress has been made in the design and manufacture of steam power plant equipment. Higher steam conditions and larger units have brought about significant improvements in efficiency. Modern control equipment has made it possible to operate a steam plant with a fraction of the labour formerly employed. On the other hand, hydro electric practice had already reached a high degree of perfection, and there was not the same room for improvement in the design and construction of water power plants.

To supply base load power competitively today a hydro site must be unusually favourable or the cost of fuel high. When both sources of energy exist, substantial economies generally can be secured by combining the advantages of both into an integrated system.

Power Generation in Alberta

Alberta is endowed with both hydro and fossil fuel resources within economic range of the principal load and population areas. An extensive network of high-voltage transmission lines already links all the Province's major hydro and thermal power plants, and this makes possible the orderly and economic development of both sources of power as may be required to provide for the growing power needs.

In a water power development a large part of the cost is represented by coffer-damming, unwatering, dams, etc., that for a given head are independent of the machine capacity installed. Further machine capacity can usually be provided at a cost per kilowatt not much more than half that of a conventional steam plant. This characteristic of hydro plants make it economically attractive to develop them to the limit for peaking purposes even in Alberta where fuel costs are low. To take advantage of this cheap "peaking capacity" at existing hydro plants, extensions have been made or are under way which will at least double the present capacities.

Principally, on the Bow and Athabasca Rivers there remains possibly several million kilowatts of potential peaking capacity within reach of the more thickly settled parts of Alberta. Plans are being prepared for the development of this hydro potential as and when required to keep the proportion of hydro peaking and base load thermal capacities such as will ensure the most economical future electric supply.

Proximity to load centres, availability of cooling and boiler feedwater and availability of low cost fuel throughout its life are the main factors affecting the location of a steam plant.

The cost of crude oil or its derivatives generally prohibits their use for electric power production other than as a standby for natural gas or coal or in small isolated diesel plants.

While natural gas is currently in wide use in

Alberta's thermal plants, it is, however, a premium fuel because of its convenience for house heating and its value as a raw material in petrol-chemical plants. Furthermore, it can be economically transported by pipe line to distant markets where fuel costs are high. It would therefore appear only a matter of time before natural gas will price itself out as a fuel in base load thermal plants, particularly where low cost strip coal is available.

Alberta has large deposits of coal which, in contrast to natural gas, cannot be transported long distances economically. Where these deposits of coal can be mined mechanically, the cost is low as compared to natural gas and it should be possible to maintain a high degree of price stability. This is particularly true in strip mines, but it also holds in highly mechanized underground operations. These coal reserves are therefore a major source of supply for the long term energy requirements of Alberta.

The Calgary Power Ltd. steam plant on Lake Wabamun is a good example of the use of available fuels for base load generation. Assuming that gas would soon price itself out of the market as the cheapest means of providing its base load requirements, a site was chosen on Lake Wabamun some 40 miles west of Edmonton, where there is ample cooling water and large reserves of cheap strip coal in close proximity. Although now fired with natural gas, the increase both in the price of gas and in the quantity required will soon make it economical to set up a strip mining operation as the main source of fuel.

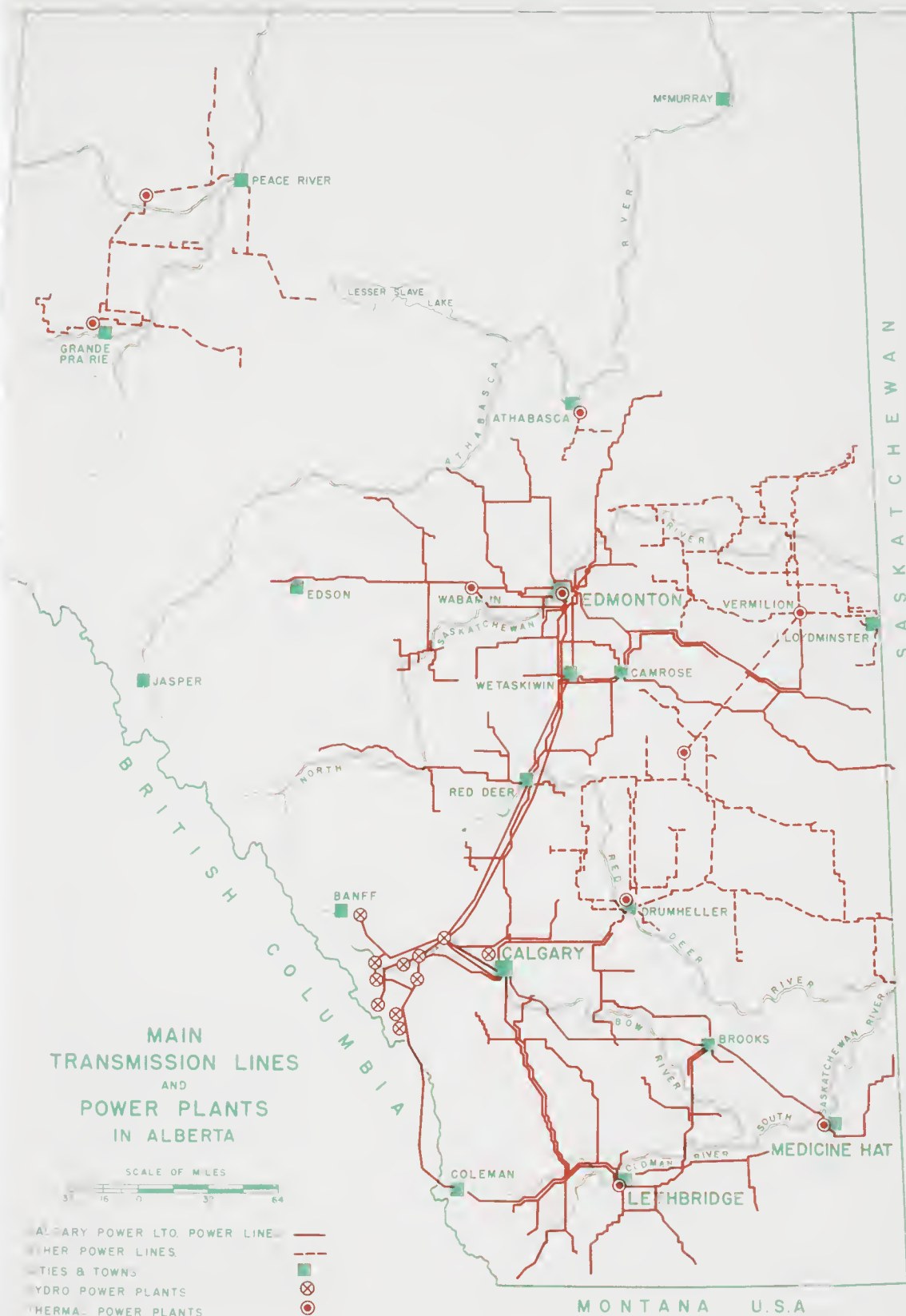
Cost of Power

Comparisons of power rates for industry can be highly misleading unless load factor and other conditions of service are taken into account. An industrial customer, such as a machine shop working day shift only, would in effect be supplied entirely from hydro, and the cost of providing such a low load factor service would be much the same as in other parts of Canada where suitable undeveloped water power sites are still available within reach of the market. On the other hand, a petro-chemical plant or a refinery operating continuously at a near full load would in effect be supplied entirely from thermal plants. For such high load factor loads, Alberta, by reason of the low cost of fuel, would enjoy a great advantage. Most loads, how-

MAIN TRANSMISSION LINES AND POWER PLANTS IN ALBERTA



- ALBERTA POWER LTD. POWER LINE ———
- OTHER POWER LINES - - - - -
- RAILWAYS & TOWNS ■
- HYDRO POWER PLANTS ⊗
- THERMAL POWER PLANTS ⊙



even on a medium load factor such as that of the City of Calgary, are a composite of these two types and can be supplied at least cost by a combination of hydro and steam.

At most of the cost of service arises from the customers' requirements for power at the time of the annual peak load on the system as a whole, industrial customers can in many cases take advantage of savings that result from special types of service, such as "off-peak", "interruptible" or "at-will". Where power is a major factor in the cost of the product, locating industrial plants close to a station such as at Wabamun or Battle River, thereby eliminating the cost of transmission, is worthy of serious consideration.

Future Prospects

Looking to the future and having regard to the rising cost of labour, the best hope of keeping down the cost of power lies in concentrating the production of energy in a few large steam plants adjacent to strip coal mines, and bringing in peaking and stand-by power from suitable hydro electric developments. The availability of low cost fuel in large quantities in Alberta gives reasonable assurance that cheap power will be available for industrial users at prices which will compare favourably with those in any other part of Canada. Furthermore, such prices may be expected to remain relatively stable for some years to come.

TABLE I

POWER PLANTS IN ALBERTA

Name of Company or Municipal Utility	Capacity December 31, 1957 Kilowatts	Per Cent of Total Capacity
<u>HYDRO-ELECTRIC</u>		
Calgary Power Ltd. - - - - -	240,000	
Northland Utilities Ltd. - - - - -	1,600	

Total Hydro-electric - - - - -	241,600	40.6
<u>STEAM-ELECTRIC AND GAS TURBINE</u>		
Calgary Power Ltd. - - - - -	72,000	
Canadian Utilities Ltd. - - - - -	68,500	
East Kootenay Power Co. Ltd. - - - - -	12,500	
City of Edmonton - - - - -	125,000	
City of Lethbridge - - - - -	13,500	
City of Medicine Hat - - - - -	43,400	

Total Steam-electric and Gas Turbine - - - - -	334,900	56.2
<u>INTERNAL COMBUSTION</u>		
Canadian Utilities Ltd. - - - - -	7,895	
Northland Utilities Ltd. - - - - -	11,435	

Total Internal Combustion - - - - -	19,330	3.2
TOTAL ALL PLANTS - - - - -	595,830	100.0

Source: Alberta Power Commission Annual Report (1957).

AGRICULTURE*

The agriculture of Alberta, at once richer in resources than that of Manitoba and less hazardous than Saskatchewan farming, provides a strong base for Alberta's rapidly expanding industrial development. Next to Ontario in livestock production and second to Saskatchewan in grain, Alberta combines the richest Parkland and finest range land of the country with fertile grain areas and Canada's only substantial irrigation development.

The 1956 Census of Agriculture reported over 79,000 farms in Alberta occupying an area of 46 million acres. The improved farm land in the province was almost one-fourth of the Canadian total, while the number of farms was 14 per cent of the total for the country. The 1955 agriculture labour force approximated 120,000 workers, also 14 per cent of the total for Canada. The average yearly cash income for the province 1951-1955 was \$442 million—17 per cent of the equivalent figure for the whole country. According to the Decennial Census, investment in agriculture was 19 per cent of the Canadian total in 1951.

Most of the problems of Alberta agriculture are those which arise from the position of the entire Canadian farm industry, rather than being peculiar to Alberta itself. If the seemingly glowing, yet soundly based, expectations for the economic development of the country over the next two decades are realized, the agriculture of Alberta will be able to resolve its problems. The expected growth should produce a substantially increased agricultural output, and cause it to become a strong and balanced industry, and yielding farm families an attractive life with generally favourable financial returns.

The developments which have occurred in Alberta agriculture over an 80 year period of growth represent an increasing intensity in the use of land. Increased mechanization has assisted this development, and the increase in numbers of livestock (except draft animals) indicates more intensive grazing. However, the ratio of capital to labour in Alberta farming is still not as high as is ideally desirable and it appears that there is considerable scope for development in this direction.

Two other considerations of importance are

changes in the numbers and size of farms. Since 1941 there has been a marked decline in numbers of farms, attributable to the improved opportunities for work and higher incomes outside agriculture, and to the fact that technological requirements have pointed strongly toward the need for larger farm units. The growth of farm size is shown by statistics: in 1901, only 27 per cent of the farms of the province exceeded 200 acres; this proportion has risen so that the 1956 Census counted more than 70 per cent in this size category. In 1956, 18.7 per cent of the farms were of more than 800 acres.

While these changes have strengthened the farm industry of the province they have not left it without problems. First is the marketing difficulty associated with wheat. No decade since the beginning of the wheat era has been free of this problem, but later analysis suggests that the seriousness of these marketing difficulties may be moderated over the next 20 years. Another troublesome element in Alberta agricultural experience is the wide fluctuations in livestock and poultry output. This should be looked upon in terms of what it means to the farm family to put in or withdraw from year to year large amounts of its resources of labour, feed, and buildings used in livestock production.

Soil Resources

Only 15 per cent of the area of Alberta, or 23.7 million acres, was classed as improved farm land in 1956. This, plus a modest addition of potential farm industry of Alberta.

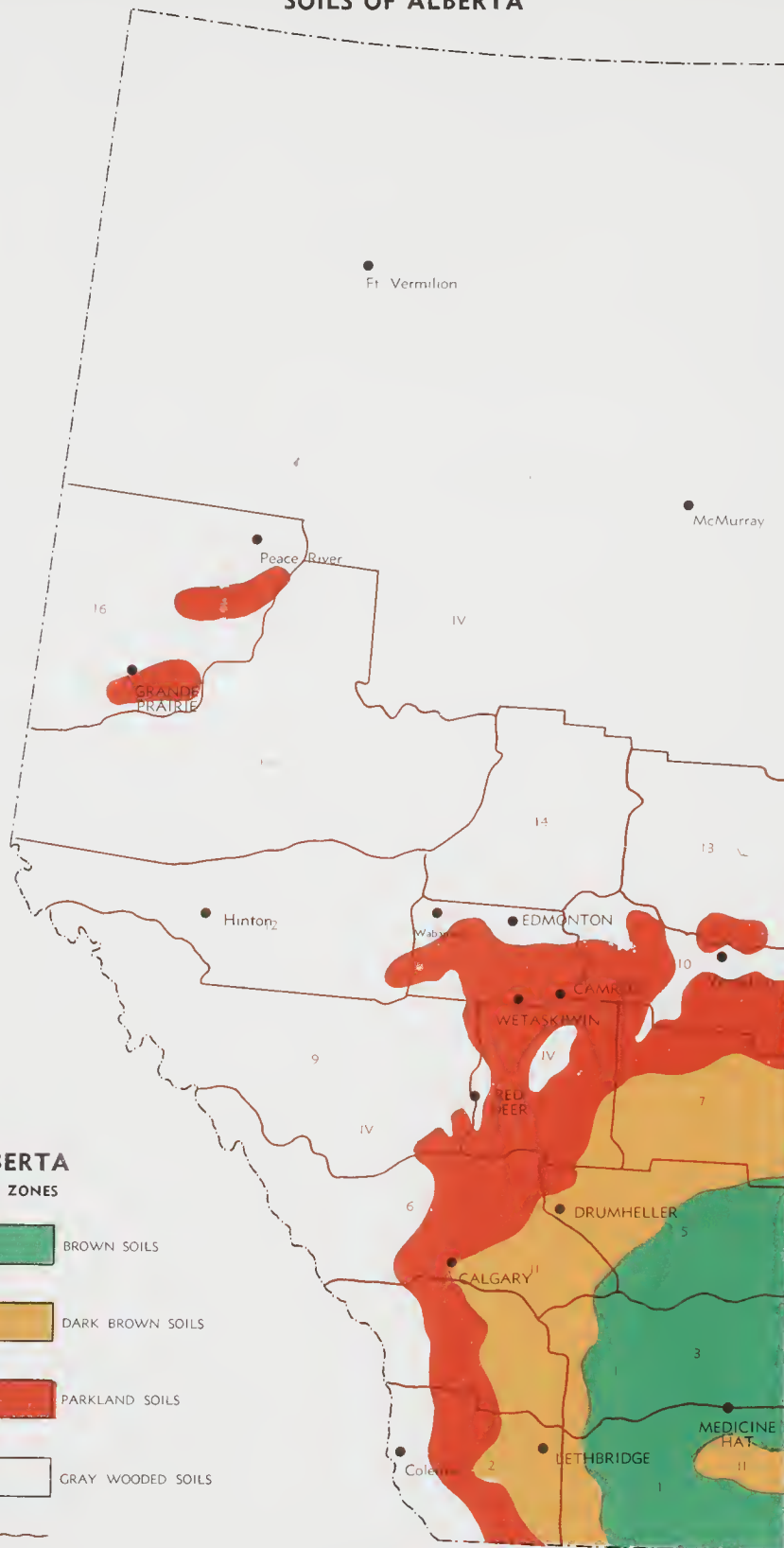
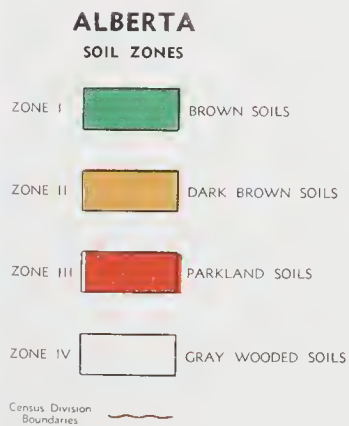
There are four soil zones of major importance to agriculture. The most appropriate uses for the soils of the four zones are described as follows by scientists of the Federal Department of Agriculture:

Zone I - Brown Soils: The heavier soils in this Zone are generally used for wheat production, while much of the lighter land is devoted to cattle ranching. Irrigation is more effective than in any of the other soil zones in the grass-land region.

Zone II - Dark Brown Soils: The heavier soils

* The year 1951 was the last year of a complete census. The 1956 agricultural census was not a complete one.

SOILS OF ALBERTA



of this Zone rate among the best wheat soils of Canada, while a considerable proportion of the rougher and higher land is utilized for grazing. The type of farming in this Zone is in general similar to that followed in the Brown Zone, although more favourable climatic conditions permit a somewhat more diversified agriculture.

Zone III - Black Soils or Parkland Soils: The typical black soils are very fertile. In addition to their greater fertility the more favourable climatic conditions in this Zone permit a more diversified type of agriculture than on the soils of the other grassland zones.

Zone IV - Grey-Wooded Soils: Due to their low fertility levels these soils deteriorate rapidly under continuous grain growing. The production of legumes and grasses in conjunction with mixed farming and the use of fertilizer is essential for the improvement and maintenance of the productivity of these soils.

While the area of Brown Soils of Zone I in Alberta is 12.5 million acres, only 2 million acres are classed as fair to good arable land. Improved land in farms, as estimated from the 1951 Census, is only 2.5 (3.5)* million acres. This is due largely to the inadequacy of precipitation, which varies from 11 to 14 inches annually. Wheat is the most important crop. Apart from small grains, grazing livestock is of greatest economic significance.

Of the 16 million acres in the Dark Brown Soil of Zone II, nine million are classed as fair to good arable land. For this zone the estimate of improved land in farms in 1951 was 5.5 (8.0)* million acres. Annual precipitation averages 14 to 15 inches. The most extensive wheat areas of the province are in this zone. The area, however, has more hogs and dairy cattle than are found in the Brown Soil Zone.

The Parkland Soils of Zone III are the most productive of the province. The zone covers about ten million acres, of which three-fourths is classified as fair to good arable land. The acreage of improved land in farms in 1951 is estimated at 9.3 (7.1)* million acres. With an annual rainfall of 17 to 18 inches, this area is well adapted to mixed farming. Here, dairying and hog production are more highly developed than in any other region.

The best areas of the Peace River country are on Parkland soils.

The Grey-Wooded Soils of Zone IV comprise an area of about 110 million acres. However, the area presently occupied or available for settlement is only 25 million acres, of which but 15 million acres might be arable. The estimate of improved land in farms for 1951 is 5.0 (3.7)* million acres. Rainfall varies from 13 to 18 inches annually, but over most of the zone the growing season is limited to 100 days or less. The soils generally present a fertility problem requiring legumes in rotation and mineral fertilizers. However, with such treatment they are good producers of coarse grains, wheat, and legumes.

New Land

In addition to the 46 million acres of land now in farms, Alberta has the greatest area of new land which might be brought into farming of any of the western provinces. The Alberta Federation of Agriculture recently placed the potential land which might be brought under cultivation in Alberta at 15,800,000 acres. Most of this new land lies in the Grey-Wooded Soil area. It is also estimated that some 2 million acres of land now in farms could be shifted from the category of unimproved to that of improved land. However, it is likely that only a small fraction of this potential land will be developed by 1975 since costs of clearing would be high, fertility is relatively low, and large increases in farm output may be achieved on presently occupied farm land with relative ease. Reliable authorities estimate 48 million acres could be in farms by 1980. There are probably 68 million acres that one day could be in farms with some 40 million acres arable.

Irrigation

Although Alberta contains the only major irrigated areas in Canada, irrigation farming has not become the widespread practice in Alberta that it has become in several areas of the United States. Confined to a relatively small area, it has been used in the cultivation of certain specialty crops. As the market for these specialty crops expands, irrigation could become more widespread. Up to the present,

* The figures in brackets are the quantities submitted to the Gordon Royal Commission by the Province of Alberta.

however, its greatest importance has been as a stabilizing influence on the farm economy of the most risky and hazardous area of the province, the short grass, Brown Soil Zone.

Conditions in Alberta have not encouraged the emergence of a uniform pattern of water use in irrigation farming, for several reasons. Irrigation is only locally important in the province, whereas in such areas as California, Arizona, and Nevada irrigated crops predominate throughout the state. Also, in Alberta, alternative farming methods are available to most farmers in irrigated areas and there has been too little in the way of an irrigation tradition. Because early large-scale irrigation projects in Alberta were conducted in areas where dry-land farming could be successfully pursued, irrigation was essentially marginal despite the heavy initial expenditures incurred by private irrigation projects.

However, the importance of irrigation farming in the agricultural life of Alberta should not be underestimated. Over the past 25 years irrigation farming has accounted for about ten per cent of gross farm revenue, and this has been derived from less than three per cent of the acreage and from five per cent of the farms of the province.

Agricultural Organization

The major agricultural regions of Alberta correspond to the soil zones. The Parkland region is, in terms of numbers of farms and acres of improved land, the most important in the province. More than 30 per cent of improved acreage is situated in this soil region. Next in importance, in terms of acreage in improved land, is the Dark Brown soil region, followed closely by the Wooded soil area.

Sixty-two per cent of the farms of the province are fully owned; another 20 to 25 per cent are in a part-owner, part-tenant category. Only 11 per cent of the farms are operated by tenants. The same general proportions apply to the amounts of land operated under these tenure arrangements. Absentee landlord farming poses no particular problem, and the tenure pattern is close to that considered ideal. In 1951 the agricultural labour force on the 79,000 farms in the province was 120,000. Thus with only 1.5 workers per farm the "family" character of the operations is very evident.

The capital investment per farm in Alberta is, by a considerable margin, the highest of any province. In 1951 at the last Decennial Census figures showed:

Type of Investment	Total (Millions of Dollars)	Average per Farm (Dollars)
Land - - -	1,015	12,045
Machinery - -	390	4,627
Livestock - -	385	4,558
Total - - -	1,790	21,222

While investment is high in relation to other provinces, it does not, however, follow that a large proportion of the farms in the province have sufficient capital to make the most advantageous use of the labour and management of the typical farm family. In terms of this criterion, the average investment in land is judged low, though not as low as that in machinery and livestock.

The volume of farm output is best shown in terms of incomes produced or realized. These are set out in the following table for the period 1951-56. Gross income in this normal period averaged over \$400 million per year; net income, which measures fairly adequately the net output of the farm industry, averaged \$237 million. According to Alberta government statistics, agriculture in 1951 accounted for about one-half of the net value of output of the major economic activities of the province. This proportion, of course, has been declining as the province secures a more mature and well developed industrial structure until in 1956 it was 29.5 per cent—prior to World War II, agriculture accounted for about two-thirds of the net output of the leading industrial groups.

The annual increase in the physical volume of farm output over the past 20 years has averaged more than two per cent. It seems likely that the physical output of the farm industry can be increased by more than 50 per cent over the years 1950-75. The strength of the economic organization of the industry strongly supports this probability. In fact, with the industry increasing its performance by two processes rather than one—converting crops to meat, milk and eggs as well as producing crops—the possible increase in production could considerably exceed the 50 per cent suggested. It is quite possible that the increase could be

ALBERTA: FARM CASH INCOME 1953-56

(Millions of Dollars)

Product	1953	1954	1955	1956*	Average	Percentages by Sources
Wheat - - - - -	187.6	107.2	100.0	133.9	132.3	31.5
Oats - - - - -	20.6	15.1	7.5	11.4	13.6	3.2
Barley - - - - -	52.9	29.4	26.8	34.8	36.0	8.6
Sugar Beets - - - - -	6.7	6.0	5.9	6.6	6.3	1.5
Other Crops - - - - -	16.0	16.0	15.2	21.3	17.1	4.1
Cattle and Calves - - - - -	69.5	74.4	77.1	86.4	76.9	18.3
Hogs - - - - -	70.7	75.3	67.2	68.2	70.3	16.7
Dairy Products - - - - -	28.6	28.9	30.2	30.1	29.4	7.0
Poultry and Eggs - - - - -	21.3	22.9	23.0	27.8	23.8	5.7
Other Cash Income - - - - -	12.4	11.1	12.1	12.5	12.0	2.9
P.F.I. A. Payments - - - - -	.6	1.0	5.8	1.3	2.2	.5
Total Cash Income - - - - -	487.0	387.3	370.9	434.9	419.9	100.0

* Preliminary figures considered high.

as high as 60 to 70 per cent. The increase which may actually be realized depends, however, to a greater extent on factors outside the industry than on such internal factors as physical resources and economic organization. The external factor which will largely determine the course of the industry is demand for the products of Alberta farms.

Demand for Agricultural Products

The future Canadian demand for farm products will be determined by the number of Canadians to be supplied, their purchasing power, and their pro-

pensity to spend their income for farm products. The population of Canada has been forecast at 24 millions in 1975, or an increase of 53.5 per cent over 1955. Income estimates indicate a per capita disposable income of about \$1,750 for 1975 compared to an actual figure of \$1,170 in 1955, an increase of about 49 per cent.

How much, however, of the predicted 49 per cent increase in per capita personal spendable income will be spent for food and other farm products? High income families always spend a smaller percentage of their income on the necessities of life than low income families. Thus food

purchases increase relatively less than many other purchases as incomes increase.

The change in demand for farm products corresponding to a one per cent change in income is estimated at about two-tenths of one per cent. The 49 per cent projected increase in disposable income thus should give an increase in demand of ten per cent due to income alone. This increase, in conjunction with the 53.5 per cent increase in population, would give a 69 per cent increase in the domestic consumption of farm products in 1975.

The export demand for farm products of a country is difficult to project at any time—particularly for a country such as Canada and at such a time as now. The countries of Europe, for reasons of defense or for more purely political reasons, are striving for self-sufficiency in wheat. The median price support in the eleven Western European countries, including Britain, which constitute the normal market for Canadian wheat was \$2.73 in the crop year 1955-56. The extent of self-sufficiency in these countries in that year was about 50 per cent.

One feature of the greatest significance in Canada's export wheat trade is the importance of United Kingdom purchases. That country takes up to half of Canadian wheat exports, purchasing from 60 to 80 per cent of her wheat imports from Canada. This is not just a result of the generally close relationship of Canada and Britain but rather because the British milling and baking trade is accustomed to using Canadian types of wheat and cannot be satisfied with substitutes. The bread of the United Kingdom is very different from that used in North America; it is a type which requires the special high protein qualities of Canadian wheat. In that sense, Canadian wheat is to a large degree in a preferred position compared to that of other countries.

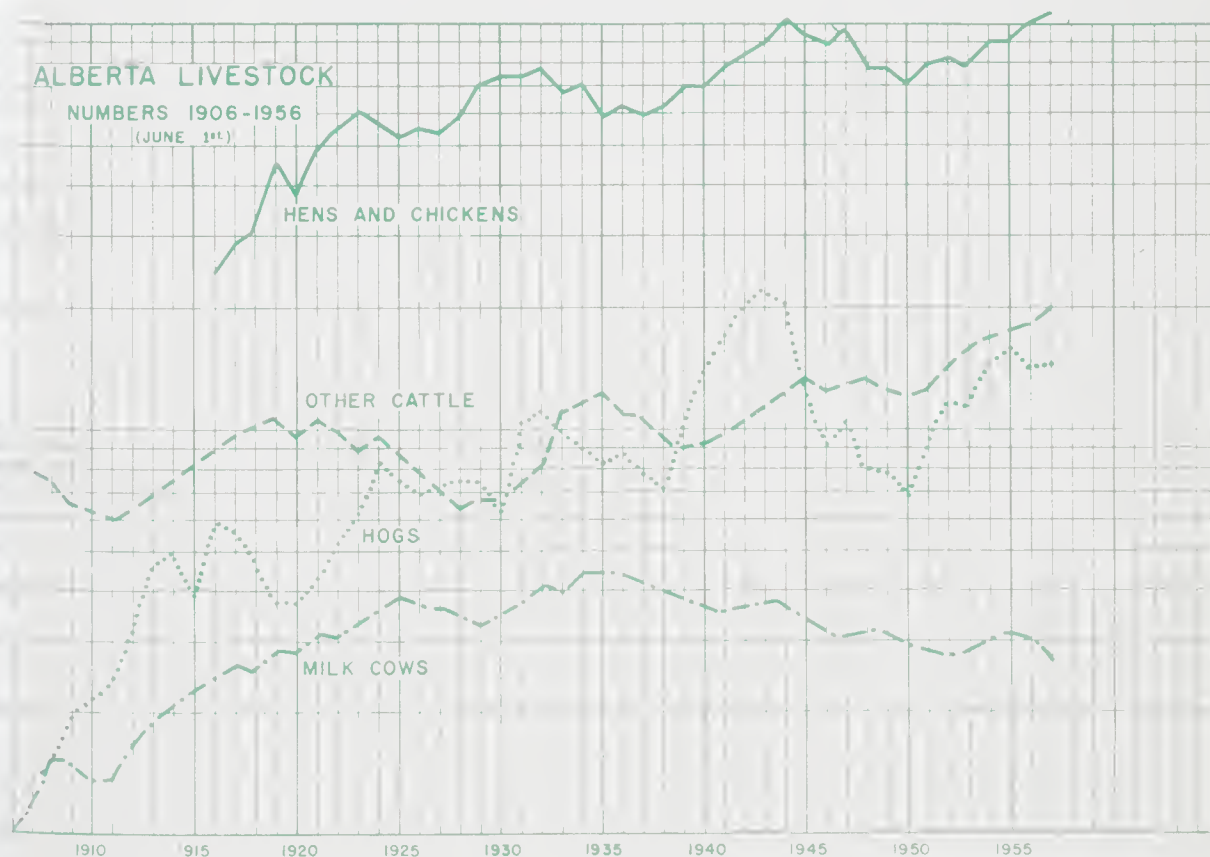
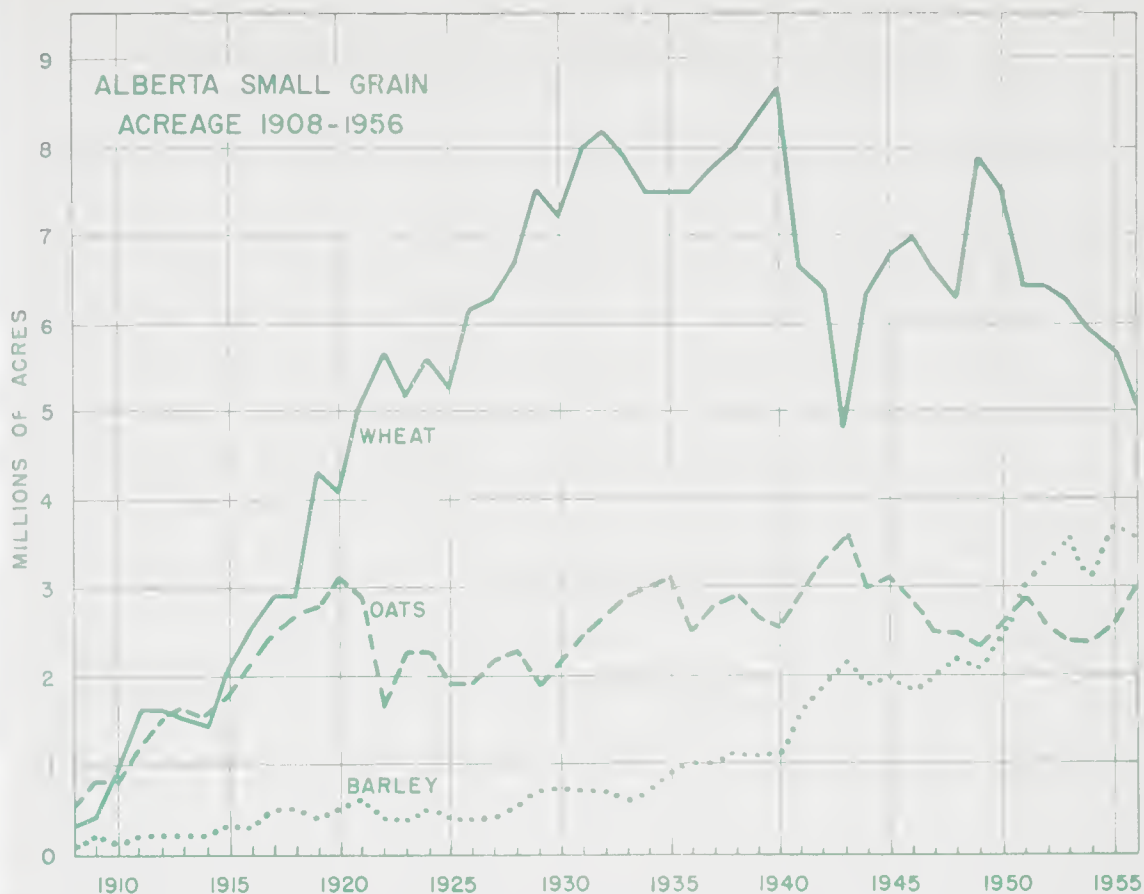
What is true of the United Kingdom is somewhat less true of several importing countries on the Continent. However, over the period 1950-1955 Canada provided 42 per cent of the net imports of wheat into Europe. Considering all factors it is believed that Canada will still hold 42 per cent of this market in 1975. This means that Canada's exports to Europe should be 300 million bushels in 1975 compared with an annual average of 188 million in the 1950-51 to 1954-55 period.

The prospective import situation for non-Europ-

ean countries is difficult to project. It is unlikely that these markets will grow, and Canadian exports to these countries have been projected at two-thirds of the average of the period 1950-51 to 1954-55, or 72 million bushels.

The discussion of wheat has intentionally been carried to this stage without placing special emphasis on the present surplus problem. Proper perspective requires examining the origins of the present surplus. These are in order of importance: (1) Unexpectedly favorable weather in North America in the past six years, and an almost perfect record of freedom from crop failures; (2) extensive European programs for increasing self-sufficiency in wheat; (3) high price supports in the United States; and (4) technological improvements reflected, for instance, in improved varieties, better cultivation and other farm practices, including the widespread use of chemical weed sprays. It has already been indicated that some relief may be expected from the second and third factors; perhaps relief from the first is even more certain. The intention of this statement is to suggest that, in making projections to 1975, we should not be unduly influenced by such surplus situations as those of the early 1940's and the present. The present surplus is likely to disappear, as others have, over a period of some five to seven years. Rather our concern with the wheat industry should be that it appears to be characterized by a chronic capacity for overproduction, thus placing the world in its periodic wheat surplus position. The greatest possible relief from this situation would be achieved by a return to competitive levels of wheat prices in both importing and exporting countries. Of this there is no immediate prospect. There is some prospect of eventual improvements in this situation, but no optimistic assumptions are presently justified.

Over the past five year period, exports have accounted for 11 per cent of Canadian oats production and 35 per cent of barley production. The overall increase in domestic demand for livestock feeds, estimated earlier at 47 per cent, will in itself place considerable pressure on production resources. This increase would require more than twice the amounts of feed grains presently exported. However, it is reasonable to assume that Canada may continue to hold a portion of her malting barley and rolled oats export markets. It would seem prudent to project Canadian exports of oats and barley at about one-third of their present levels, or at about 16 million bushels for oats and 29 million



PRODUCTION OF IMPORTANT FARM PRODUCTS IN CANADA, 1975

(A projection for 1975 compared with 1955 production)

	Animal Feeds	Domestic Consumption			Projections				Seed etc.	Total 1975	Total 1955
		Human Food and Industrial Uses	Total	Export							
				Europe	Other	Total					
Wheat (millions of bushels) -	-	74	183	300	72		372	36	591	447*	
Oats (millions of bushels) -	-	7	440	-	-		16	30	486	330*	
Barley (millions of bushels) -	-	••	176	-	-		29	15	220	203*	
Meat (millions of pounds) -	-	-	5,200	-	-		-	-	5,200	2,900	
Milk (millions of pounds) -	-	-	25,700	-	-		-	-	25,700	17,289	
Eggs (millions of dozens) -	-	-	664	-	-		-	-	664	386	

* 1951-55 acreage with normal yields

•• Less than 0.5.

TABLE III

**CANADA, PRAIRIE PROVINCES AND ALBERTA:
PRODUCTION OF IMPORTANT FARM PRODUCTS, 1955
(INCLUDING SOME ESTIMATES) AND PROJECTIONS FOR 1975**

Product	Unit	Present Production*			1975 Projections		
		Canada	Prairies	Alberta	Canada	Prairies	Alberta
Wheat - (millions of bushels)		447	427	119	591	565	150
Oats - (millions of bushels)		330	241	85	486	355	125
Barley - (millions of bushels)		203	194	79	220	210	90
Meats - (millions of pounds)		2,900	1,624	783	5,200	3,000	1,600
Milk - (millions of pounds)		17,289	3,789	1,431	25,700	5,650	3,600
Eggs - (millions of dozens)		386	118	46	664	200	75

* Wheat, oats and barley: 1951-55 acreage with normal yields.

bushels for barley. This takes into account three important factors: exports over the past five years have reflected an unusually favourable period so far as yields are concerned; there is the prospect of a gradual increase in acreage and long term average yields; and as the United States proceeds with its Soil Bank program, that country will likely substitute coarse grains for some corn, thus reducing import needs for the latter.

Considering that Canada is a deficit producer of beef; that the exports of pork products account for less than ten per cent of Canadian production; and that domestic demand is increasing, it seems advisable to project no exports of livestock and livestock products for 1975.

Table II presents in summary form the projections of expected farm output in 1975, compared with current quantities of outputs. The products listed account for more than 90 per cent of cash farm income. Expressing the results of Table II in a single figure, the expected increase in the physical volume of farm output is 2.5 per cent per year compounded annually.

Land and Labour Requirements

Technological advances, according to careful

studies, will account for substantial production increases over the next 20 years. For the Prairie Provinces, the output required by 1975 can very likely be met by use of present land. The only possible exception is in feed grains, and here the required increase in land may be about two million acres. A slight increase in wheat acreage may also be required, but all these increased land requirements can probably be met from decreases in summerfallow acreage. This will come about in the Parkland and Grey-Wooded soil areas as a result of the wider adoption of crop rotations. Moderate increases in the acreages of vegetable crops may also be required—but these will require little additional land.

With respect to labour requirements on Canadian farms it is expected that despite a small increase in the area under cultivation, there will be a decline of about 15 per cent in the number of farms and a decline of some 20 per cent in the farm labour force. The expected decline in the Province of Alberta is not as great, since farms are already of fairly efficient size and there are in Alberta no significant pockets of under employed workers in the farm industry. It is estimated that in Alberta there will be a ten per cent decline both in number of farms and of farm workers.

Future Alberta Agricultural Output

There are great difficulties in making meaningful projections of the agricultural output of a single Prairie Province. If difficulties of a logical character exist, they are exceeded by those of a statistical character; for instance, meat output data

exist only on a national basis. However, an attempt is made in Table III to break down the base period data (generally 1955) and the projections for 1975 which were presented in Table II. The breakdown is for the Prairie Provinces and for Alberta. The six items account for more than 90 per cent of cash farm income in recent years.

FORESTRY AND LUMBERING

There is a fundamental difference between logging and sawmilling practices east and west of the Rocky Mountains. Because of the large size of much of the timber in British Columbia, massive machinery has to be used in handling the logs. Year-round operations are possible in the coastal sections because of the mild climate. East of the Rockies, the trees are smaller and the logging industry is not so highly mechanized. The bulk of the cutting and hauling is done during the winter months since transportation is easiest when the ground is frozen and snow-covered, and operations then are more economical than in summer. The trend has been to build small sawmills, many of them cutting less than one million board feet annually. A large proportion of the small mills are portable and are moved close to the timber to be cut.

In Alberta, as is general in woods' operations east of the Rockies, employment reaches a peak during the intensive cutting period in January and early February and gradually declines later in February and March during the hauling season. Employment remains at a low level from April until the late autumn. The winter demand for labour in the forests has the advantage of supplying employment for labour from other industries such as agriculture and construction, whose peak demand for workers occurs during the summer months.

Forest Area

It has been noted that the forested area of Alberta, including National Parks and the Rocky Mountains Forest Reserve, covers approximately 106 million acres. The area of management units in which timber operations had been carried out by early 1956 amounted to some 53.6 million acres.

The exploited forest area thus amounts to approximately 51 per cent of the total forest area in Alberta.

Only about two-thirds of the forested lands are productive or potentially productive, since there are included in the forest zones numerous areas consisting of swamps, muskeg, barren or scrub land which are classed as non-productive or non-commercial.

Forest Utilization

The annual cut of timber in Alberta was 108 million cubic feet in 1953 and 107 million cubic feet in 1954. The annual cuts of timber in the whole of Canada in 1953 and 1954 were 3,079 and 3,122 million cubic feet respectively. The value of this primary forest production in 1953 for Canada was approximately \$780 million, of which \$16 million was the value of Albertan production.

Alberta's forest lands make up 10.2 per cent of the Canadian total but the physical volume of her output of primary forest products in 1954 was only 3.4 per cent of the national total. The forest resources of Alberta thus have not been utilized as fully as were, on the average, forest resources across the country or as fully as their extent might have justified. This was partly because, until 1956, there was almost no pulpwood production. In the other provinces of Canada, on the average, pulpwood accounts for about 40 per cent of the forest output. Alberta's first pulp mill, now in operation, is expected, at initial capacity, to take annually some 350,000 cords of pulpwood, equal to about 30 million cubic feet. There should thus be an immediate increase in Alberta's output of primary forest products.

Although the recent Alberta forest inventory indicates that the forest stands average about 53 per cent softwood and about 47 per cent hardwood, by far the greater proportion of the timber cut consists of the softwoods. White spruce makes up about 90 per cent of the lumber produced, and most of the remainder is pine, with Engelmann spruce and black spruce utilized to a limited extent. Balsam fir accounts for about one per cent of the timber cut. Birch was in demand during the last war when a large amount was supplied to aircraft factories on the West Coast. Plywood manufacture commenced in Alberta in 1953 and there are now three plants which are expected to utilize, in all, about 30 million feet board measure (6 million cubic feet) annually of poplar. A fourth plywood plant is projected. A considerable amount of hardwood is also used as fuel.

The greater utilization of spruce and other softwoods, rather than hardwoods, for lumber production, is general across Canada. The total amount of hardwood lumber produced in Canada in 1954 was only 6.2 per cent of the amount of softwood lumber cut.

Forest Losses

An important influence on forest growth is the loss from fire, insects and disease. Over the 10-year period 1946-1955, the burnt-over forested areas in Alberta averaged 230,000 acres annually, with a high variation in individual years. This annual loss amounted to 0.2 per cent of the total acreage included in the forest lands. The value of timber destroyed by fire during this period has been estimated to average \$1.2 million annually. The average annual loss by fire of timber in the whole of Canada for the same period has been estimated at \$4.1 million.

The Provincial Government maintains a fire protection organization and co-operates with licensees for fire protection on their timber berths. There are regulations governing the use of fire for clearing and other purposes, and closed seasons are established when a fire hazard is great. Protection measures have been steadily expanded, and the enforcement of legislation dealing with fire prevention and a campaign of education have done much to reduce the incidence of fires.

The annual loss of timber in Alberta due to dis-

ease and insects is difficult to estimate but is believed to be in the order of 75 million cubic feet. Active research is carried out by the province in co-operation with the Dominion in forest entomology, forest pathology, wood utilization and technology and in technical forestry. The results of these investigations will insure that the best techniques are available for the sustained growth and most efficient utilization of the forests.

Forest Management

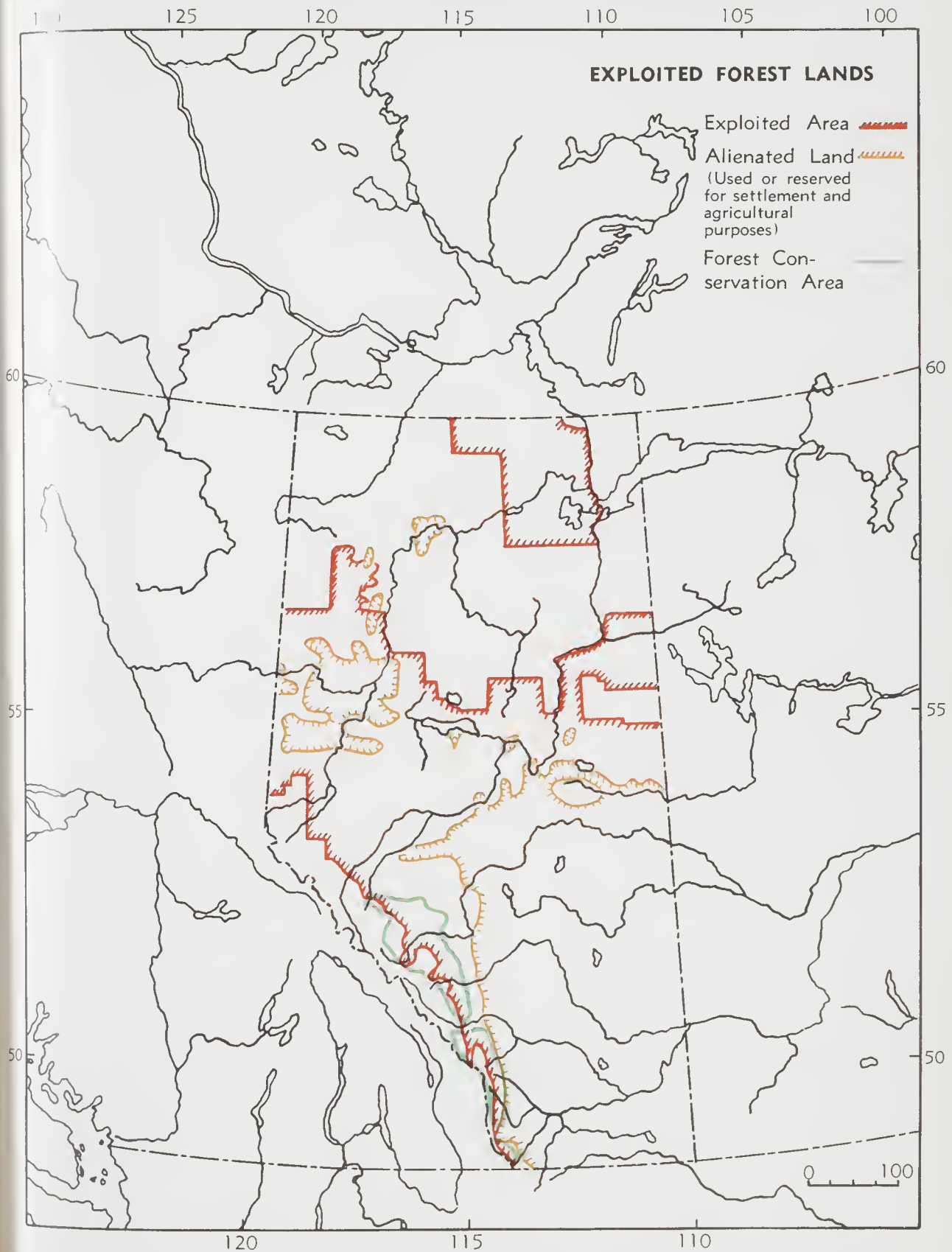
Since 1930, when natural resources were turned over to the province, the forests in Alberta, with the exception of the National Parks, Indian Reserves and the Rocky Mountains Forest Reserve have been administered by the Forestry Branch of the Department of Lands and Forests of the Province of Alberta.

The Rocky Mountains Forest Reserve is under the jurisdiction of the Eastern Rockies Forest Conservation Board set up under joint Federal and Provincial auspices to administer the three Provincial Forest Reserves of Crowsnest, Bow River and Clearwater—a total of 8,619 square miles (55 million acres). The maintenance of the flow of the South Saskatchewan River is the primary purpose of this Board, and it regulates forest use with this objective in mind. Otherwise, regulations in this area are similar to those in the remainder of the forested districts.

It has been the policy of the Federal and Provincial authorities in Alberta to dispose of timber by means of leases and licences to cut rather than by selling timber land outright. This permits control of cutting operations and exercise of forestry management. Dues or stumpage are collected for the timber cut and an annual charge is made for fire guarding. Farm woodlots, however, are privately owned and are estimated to total about 2.9 million acres in Alberta.

Approximately 2.6 million acres of Provincial Crown land were under licence to timber operators in 1956. This figure includes 1.9 million acres under lease for 21 years to North Western Pulp and Power Ltd.; all other leases are renewed on an annual basis. It does not include a 3 million acre forest option held by Alberta West Forest Products Corporation Ltd. in the Whitecourt region.

FORESTRY AND LUMBERING IN ALBERTA



In order to implement plans for the best utilization of the timber resources, the exploited commercial forest area is divided into management units, each averaging about 1,000 square miles. Most of these so far, are south of the 57th parallel but exploitation of the forests is gradually being pushed further into the less accessible northern areas.

A management plan prepared for each unit includes a cutting program to regulate cutting rates so as to assure a sustained yield, with healthy stands of better age groupings; a protection plan to preserve the forests as far as possible against fire, insect and disease; and an improvement plan to increase the availability of preferred species. Complete records are kept. Management plans for many units are already in operation. These will be expanded as more information is acquired and as the need arises.

The practicality of the management plan is shown by its application to the cutting of white spruce. This has been the most heavily exploited species and appears to be the most difficult to regenerate. It is becoming necessary, therefore, to place white spruce on a sustaining basis in those areas where timber operations have been carried on in the past. In some areas, this may mean the selling of only decadent lumber; in others, the selling of only mature and decadent spruce, in still others it may be necessary to restrict completely the cutting of spruce.

Future Utilization of the Forests

At the present time, as has been noted, most of the timber cut in Alberta consists of white spruce. The forest inventory, recently completed, has shown that this species has been over-exploited and that there is danger of a serious shortage if this continues. It will be necessary to place white spruce on a sustaining basis once the mature and over-mature timber is removed. More diversification of species used will also be necessary and the trend is in this direction. Considerable quantities of pine are available but have not been utilized to a large extent as consumer preference is for white spruce. The smaller proportion of pine of saw-log size, compared to white spruce, militates against its use. Pine, however, is equal or even superior to white spruce for many uses and its utilization should grow as consumers are educated to its merits. Poplar constitutes a large proportion of the forest trees,

and is easy to grow, reaching maturity in about eighty years. There is increasing use of poplar for plywood manufacture but further uses for this wood should be sought out and encouraged.

Added value can be obtained from the products of the forests by utilizing the by-products or wastes of the wood-consuming industries. For example, by the manufacture of board and other synthetic products from wood fibre, chips, shavings and sawdust. The market for such products is steadily increasing.

The present annual cutting drain on Alberta forests, including the demand of the new pulp mill, is about 130 million cubic feet of timber. The Alberta Government has estimated the annual maximum sustainable cutting drain on its forests as approximately 400 million cubic feet for the softwoods and 415 million cubic feet for the hardwoods—a total of 815 million cubic feet. This figure is based on present conditions and assumes that the forests would renew themselves to the same composition and acreage. Improvement in silvicultural practices, greater efficiency in utilization, and reduction in fire losses in the future may enable these figures to be revised upward.

The balance between demand for wood over future years, and supply of wood available on a sustained yield basis, must be investigated before conclusions can be reached regarding future lumbering activity in Alberta.

The demand for wood is estimated on the basis of forecast growth of the wood-using industries, discussed below in Chapter V. The estimates are as follows:

	Present	1975
	(millions of cubic feet)	
Wood used in sawmills, sash,		
door and planing mills, plywood and veneer mills, etc.,		
and for fuel - - -	100	180
Wood used for pulp and		
paper - - - -	30	120
- - - -	—	—
Total - - - -	130	300

This forecast for 1975 appears to be comfortably below the maximum net sustainable cut, estimated at 815 million cubic feet annually. However, it seems likely that only about 25 million of this forecast 300 million cubic feet will represent demand for hardwoods. A requirement of 275 million cubic feet of softwood is balanced by a net sustainable cut of softwood estimated at only 400 million cubic feet.

As shown by these figures, it should be possible to obtain an annual yield of wood considerably in excess of the 1975 estimated requirements, while maintaining the forests on a sustaining basis. If full advantage is to be taken of the potential value of the forests, however, it will be necessary to make increased use of hardwoods and of the species of softwoods not at present being fully utilized.

MINING

Income from mineral production accounted for twenty-three per cent of the net value of all production in Alberta in 1955 and twenty-five per cent for 1956. The major part of this income was realized from petroleum and natural gas. Coal and other minerals are important to Alberta at the present time and are likely to be of even greater importance in future years. Alberta's geologic formations, including both plains and mountains, provide the basis for a wide range of mineral operations. The contact with the pre-Cambrian Shield to the north further extends the range of probable mineralization.

Total Canadian coal production has always fluctuated widely. From a 1931 low of 4.6 million tons, production reached a maximum of 19.1 million in 1950. Since 1950 production has been declining toward the depression minimum and there seems little probability of an immediate reversal of the trend. While in the past coal production kept pace with general economic activity, it is now one of the few declining activities in a growing economy.

The importance of fuels to the Alberta economy has been marked since the early days of settlement. Known mineral resources other than fuels are principally non-metallic and comprise a wide range of industrial minerals. Certain of these are currently being utilized and support important and growing industries. Others await development, and will undoubtedly be exploited to support future industries as markets expand. The availability of large, low cost fuel resources should materially facilitate these developments.

There are fifty coal districts in Alberta, classified in five groups based on the physical properties of their coal. Group I includes low volatile non-caking bituminous coals and some semi-anthracites. These coals store well, and are used for domestic heating, railway fuel, and steam generation. Group II comprises medium and high volatile caking bituminous coals. These coals have good storage qualities and uses similar to those of Group I, but are also used for coke manufacture, for smithy coal, and in the cement industry. Group III includes non-caking high volatile bituminous coals, which ship and store well, and are used for domestic heating and steam generation. Group IV coals are sub-bituminous, have fair storage qualities and cover, and are principally used for domestic heating and steam generation. Group V coals are sub-bituminous types with poorer storage qualities than Group IV coals, and are used for domestic purposes and steam generation. Table IV gives typical general analyses of the five Alberta coal groups.

Coal

Alberta coal production has usually been between one-third and one-half of the Canadian total and, from 1942 to 1953, exceeded that of any other province. In 1956, 4.3 million tons were mined in Alberta, or about 29 per cent of the Canadian total of 14.9 million tons. In 1957 the figures were 3.2 million tons or about 24 per cent of the Canadian total of 13.2 million tons. The other major coal province, Nova Scotia, has exceeded Alberta in coal production since 1953, probably because of the lesser impact of petroleum on eastern coal markets.

The recent decline in coal production has been most marked in bituminous coal output, which formerly accounted for some two-thirds of coal production, but had fallen to less than half the total by 1956. Railway dieselization has been the main cause of this decline in bituminous production. Output trends have differed in the various coal areas, and production of Group V coals has experienced

ence fairly steady expansion in contrast to declining or hesitancy in production of other Groups. At the present time, production in all five Groups is slowly tending toward equality; larger producers in certain areas have suffered as a result of this. The fortunes of individual mines and districts have frequently varied to a greater extent than those of the coal Groups, some producers closing down while others have increased their activity. The communities of Mountain Park, Cadomin, Luscar and Mordegg, in areas of Group I and II coals, have been severely affected by loss of coal markets.

The percentage of coal which is strip mined has increased in recent years, and in 1955 was 47.3 per cent and in 1956 46.3 per cent. The average output per man-day in 1955 was 12.23 tons for strip

mines and 3.98 tons for underground workings. The underground output per man-day compared favourably with other provinces, but the strip mining ratio was below the Canadian average. The latter, however, is influenced by Saskatchewan output ratios, which are high because of favourable overburden conditions. Average output per man-day for all coal produced was higher in Alberta in 1956 (12.81 tons man-day) than in any other province except Saskatchewan, and was more than 50 per cent above the Canadian average.

Operating costs and profitability of Alberta mines compare favourably with those of other provinces, as seen in Table V. Saskatchewan mines have low average operating costs, but their revenues are correspondingly low.

TABLE IV

TYPICAL ANALYSIS AND CALORIFIC VALUE OF ALBERTA COAL TYPES

								Group I	Group II	Group III	Group IV	Group V
								(approximate per cent by weight)				
Fixed Carbon	-	-	-	-	-	-	-	77	60	47	43	38
Volatiles	-	-	-	-	-	-	-	12	27	33	29	29
Ash	-	-	-	-	-	-	-	9	11	10	8	5
Moisture	-	-	-	-	-	-	-	2	2	10	20	28
								(B.t.u. per pound)				
Calorific Value	-	-	-	-	-	-	-	14,200	12,800	10,700	9,300	8,400

TABLE V

OPERATING COSTS AND REVENUES PER TON OF MARKETABLE COAL PRODUCED 1954 AND 1956

Area								1954	1956	1954	1956	1954	1956
								Operating Cost		Revenue		Profit or (Loss)	
								\$		\$		\$	
Nova Scotia	-	-	-	-	-	-	-	9.89	9.98	9.84	9.83	(0.5)	.15
New Brunswick	-	-	-	-	-	-	-	7.77	7.86	8.12	8.41	.35	.55
Saskatchewan	-	-	-	-	-	-	-	1.75	1.67	2.01	2.07	.26	.40
Alberta Prairie (Stripping)*	-	-	-	-	-	-	-	4.67	3.32°	4.94	3.38°	.27	.06
Alberta Foothills (Underground)*	-	-	-	-	-	-	-	6.54	6.45°	6.39	7.09°	(.15)	.64
Alberta Mountain	-	-	-	-	-	-	-	6.42	6.53	6.61	6.59	.19	.06
British Columbia and Yukon	-	-	-	-	-	-	-	6.86	6.47	7.54	7.42	.68	.95
Total Canada	-	-	-	-	-	-	-	6.92	6.98	7.08	7.18	.16	.20

* Change in terminology effective 1956.

In 1946, when coal sales reached a peak of 8.1 million tons, the division of shipments to various markets was quite representative of years preceding the current decline. Table VI gives sales data for this year and for 1956, when sales had dropped to 3.6 million tons and a significant realignment of markets had occurred. Of primary significance has been the decline in railway demands brought about by the conversion of coal locomotives to the use of heavy oil, and by dieselization.

The decline in the prairie markets for Alberta coal, caused by the increasing availability of oil and gas at low cost, has been encouraged by a general prosperity which has led to conversion to these newer fuels for space heating and hot water heating even in districts where coal is competitive in price. The largest Alberta cities are more than 90 per cent converted to gas heating. Thus, while the consumption of coal in the prairies fell by 26 per cent in the period 1946-1953, oil consumption near-

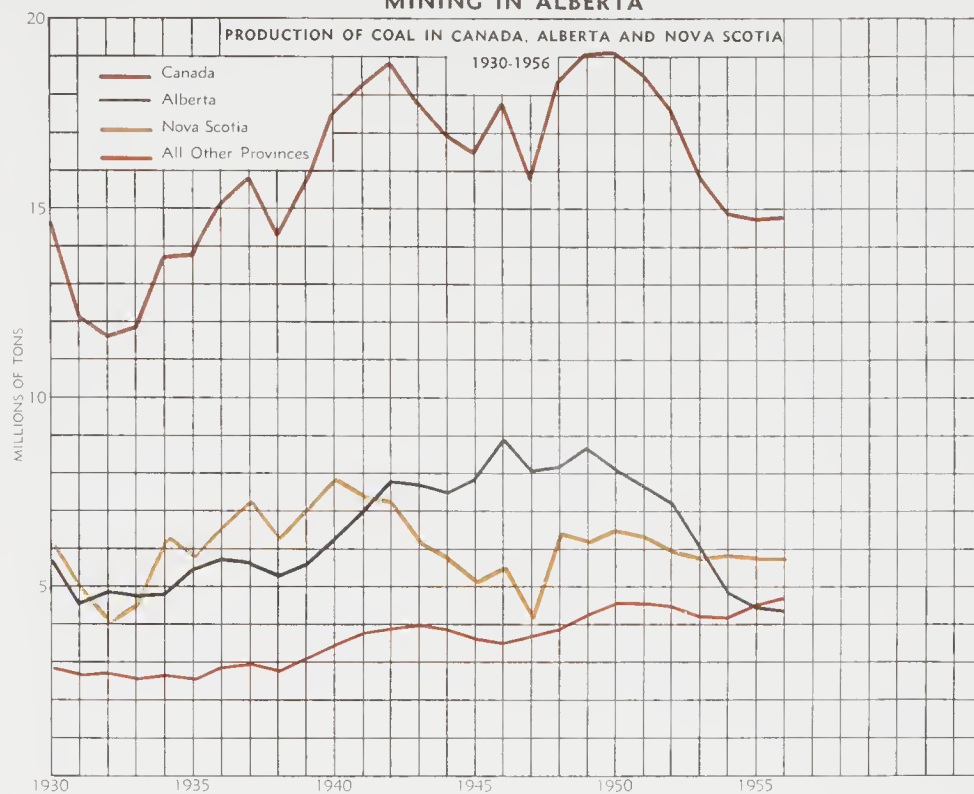
ly tripled and gas consumption rose by 51 per cent.

Currently, coal is still losing markets; production is being curtailed and mines are being shut down. There is no immediate indication of a reversal of this trend, and the short-term outlook must be considered unfavourable to coal.

On the other hand, demands for energy are increasing so rapidly that reserves of oil and natural gas, excluding the oil sands, will probably prove incapable of supplying them in the not distant future. Added to the supply problem is the cost factor; as petroleum reserves decrease, petroleum prices must go up, thus favourably affecting the position of other fuels.

Improvements in the competitive position of coal may also be obtained by advances in the cleaning, handling, sizing, and marketing of coal, all of which are in progress today. Within the North American coal industry as a whole, there is greater

MINING IN ALBERTA



MINING IN ALBERTA

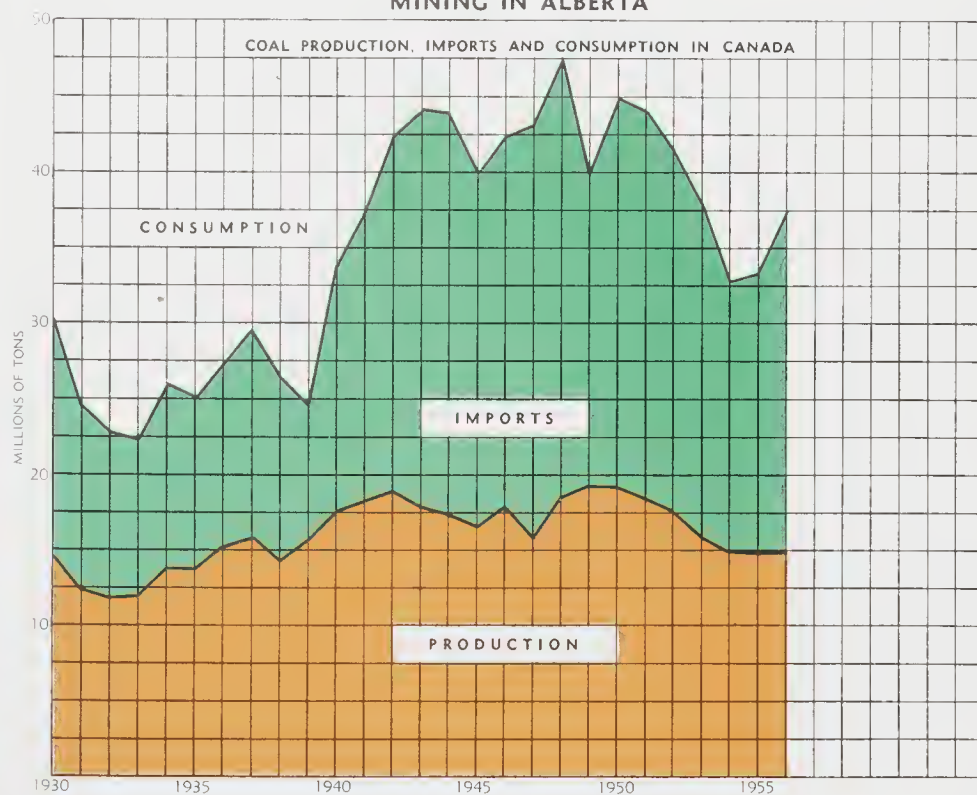


TABLE VI

SHIPMENTS OF COAL FROM ALBERTA MINES 1946 AND 1956

Consumer	1946		1956	
	Quantity in Tons	Per cent	Quantity in Tons	Per cent
Railways - - - - -	2,893,207	35.5	385,388	10.8
Alberta - - - - -	1,608,296	19.7	1,015,309	28.5
Saskatchewan - - - - -	1,449,002	17.8	871,730	24.5
British Columbia - - - - -	982,413	12.1	860,013	24.2
Manitoba - - - - -	658,733	8.1	305,155	8.6
Ontario - - - - -	348,137	4.3	75,148	2.1
United States - - - - -	137,271	1.7	45,652	1.3
Others - - - - -	59,635	0.8	120	—
Total - - - - -	8,136,694	100.0	3,558,515	100.0
			3,208,066	(1957)

attention to combustion efficiency design in plants and equipment, more automatic coal handling and better domestic equipment for heating. The emphasis on convenience, rather than on cost alone, is a major spur to such improvements.

In terms of energy, coal reserves at 48 billion tons are a much greater source of fuel and energy than oil, gas and hydro power resources combined. Natural gas reserves are currently estimated at some 21 trillion cubic feet and virgin reserves may reach some 75 trillion cubic feet; coal reserves of 48 billion tons are equivalent to some 960 trillion cubic feet. Oil reserves may eventually reach a total of some 15 billion barrels; this is equivalent to about 5 billion tons of coal or about one-tenth of the coal reserves.

The oil sands, in turn, have a slightly greater energy content than the coal reserves. It has been estimated that some 2,500 square miles of known deposits may contain some 150 billion barrels of oil equivalent to some 50 billion tons of coal. The oil content of the sands, the depth of overburden and other technical features considerably

reduce the quantity of oil which may be recoverable.

For the next few years there is little to suggest any reversal of the current decline in Alberta's coal industry. The dieselization program of the railways is continuing at a rapid pace, and within three or four years the railways will provide only a minor market for Alberta coal. The decline in the use of coal for domestic and commercial space heating purposes will chiefly affect Alberta's markets outside the province. Thus, the extension of the natural gas pipe line to the Vancouver area will make serious inroads in the British Columbian market for Alberta coal. This coal, largely from Group III mines, has found a ready domestic fuel market in British Columbia. The domestic and commercial space heating market in Saskatchewan and Manitoba will decline with the provision of natural gas facilities, in addition to the competition of fuel oil and propane.

The important markets that coal has found in the food processing industries, such as meat pack-

ing and sugar refining, are being lost to natural gas, while the non-metallic mineral industry in Alberta—despite its growth in recent years—constitutes a declining coal market as well. There is little likelihood that other manufacturing industries will move against this trend.

In the immediate future the best prospects for the Alberta coal industry would seem to lie in the expansion of coal-fired thermal power plants within the province and possibly in the Saskatoon area of Saskatchewan. Two large steam plants designed to use strip mined coal are being brought into operation, one at Lake Wabamun which will initially use natural gas, and the other on the Battle River. The Wabamun plant will eventually burn in excess of 1,600,000 tons a year, while the Battle River plant will eventually use about 300,000 tons of coal annually.

The net result of all market factors is likely to be a continuation of the current decline until early sixties, when oil and natural gas will perhaps have attained their maximum competitive share of the fuel markets. From this period, coal may experience a recovery spurred by other developments in the province and surpass its present position by the mid 1970's. Much of this recovery will probably be associated with electric power developments.

Eventually coal will find its appropriate place in the overall energy situation, now emerging but not yet stabilized. The only forecast justified by the current situation is that Alberta coal production will continue to decline, until 1965. There will then follow a gradual rise in production to about 7 million tons per annum by 1975, with the prospect that coal output would then continue to rise steadily.

In the more distant future, new demands for coal are likely to enhance its importance. Coal chemicals have for many years been a valuable by-product of coking operations, and as such, an indirect support of the coal industry. The demand for such coal chemicals as benzene, toluene and xylene has readily kept pace with the supply from coke ovens, and is steadily increasing. Although the petrochemical industry has boomed in the last decade, the market for coal chemicals has not suffered; the production of these chemicals from petroleum products is in many cases uneconomic.

Two future developments appear likely. First,

as the demand for traditional coal chemicals continues to grow, it may be expected that the supplies obtained as coke by-products will be augmented by supplies made directly from coal with a char as by-product. Second, with the progress of chemical research, it is most likely that more and more complex synthetic organic chemicals will be developed to form the basis of new synthetic fibres, rubbers, plastics and other consumer products. In many cases coal, which has a more complex chemical structure than petroleum, will be the logical starting point for these new products. Neither of these developments is likely in the immediate future, but the long range prospect is for an important direct use of coal as a chemical raw material.

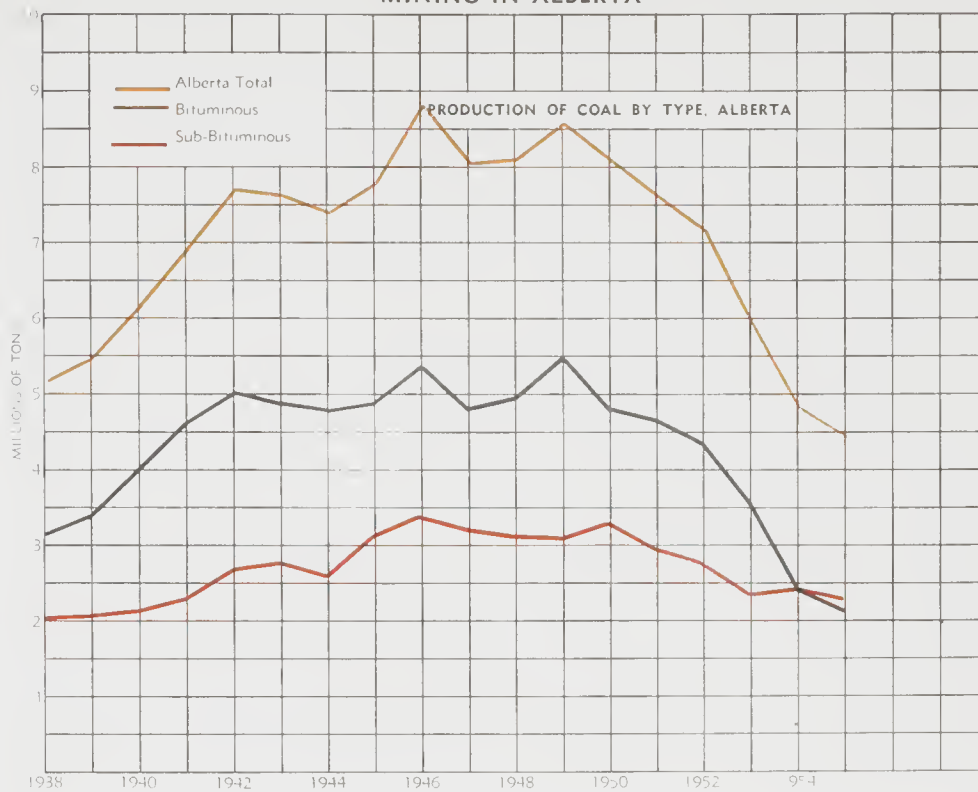
Conversion of coal to liquid fuels and gas, which is now technically feasible, will become commercially feasible with increases in the price of oil and gas. How rapidly this conversion of coal to liquid and gaseous fuels comes about is dependent upon the demand for the petroleum products and the rate of depletion of the oil and gas reserves. It is reasonable to assume that, as gas and oil reserves are depleted, oil and gas from coal will augment and eventually replace the natural products. Some sources forecast major production of oil from coal within fifteen years on the North American continent.

Other Minerals

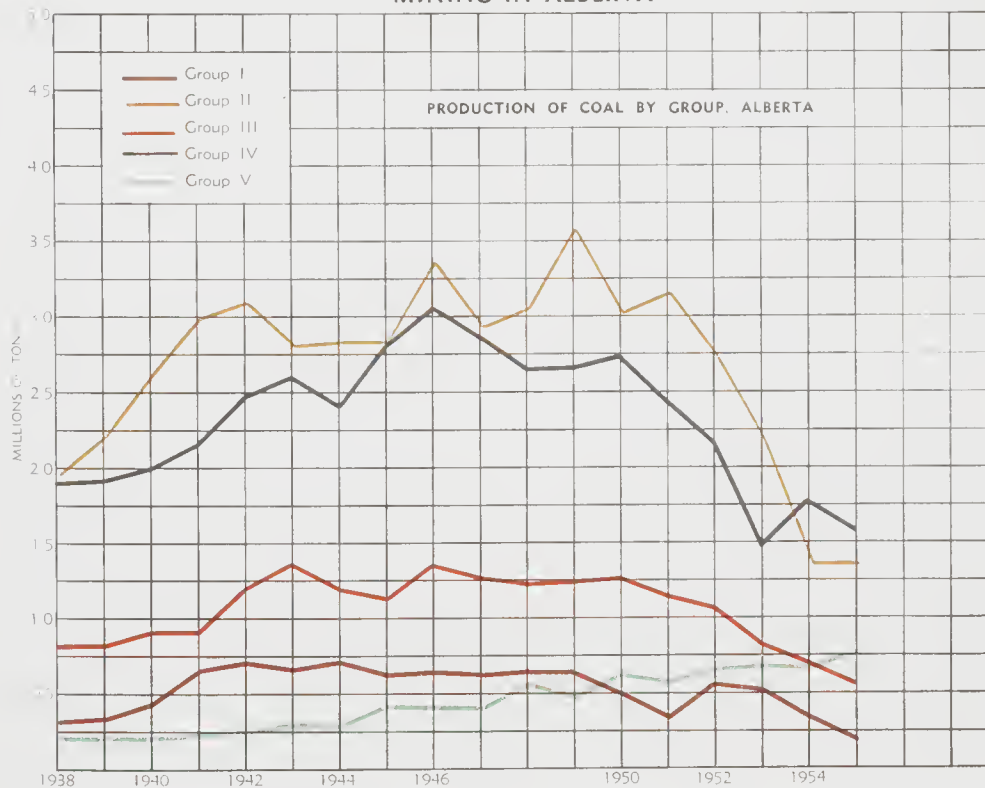
Sand and Gravel: With a production of 10,894,762 tons and a value of \$8,502,720 in 1957 sand and gravel form Alberta's most important non-fuel mineral group. There has been a continuous annual growth in output and value since 1942, except for the year 1949. Production in 1957 was more than five times the 1946 volume and over eight times the value. The main uses, in concrete work, building and road construction and as railway ballast, could lead to an increase in annual production to some 20 million tons of sand and gravel by 1975.

There are about 12 major producers of sand and gravel with headquarters in Edmonton, Calgary, Cochrane, Devon, Didsbury and Peace River, but the deposits utilized would naturally be as close to the work in hand as circumstances permit. Sand and gravel are becoming less available in proximity to the major centres.

MINING IN ALBERTA



MINING IN ALBERTA





Limestone: Limestone finds its major use in Alberta in the manufacture of cement. In 1957 Alberta produced 602,000 tons of cement, which would require about 815,000 tons of limestone and about 140,000 tons of clay, shale and sand. Second important use for limestone is in the manufacture of brick: 41,082 tons were manufactured in 1957, from some 62,000 tons of limestone. Small quantities of limestone are used, in combination with shale, in the manufacture of rock wool.

In addition to its use in the manufacture of cement, lime and rock wool, the consumption of limestone in 1955^{*} amounted to 23,577 tons valued at \$1,831. This amount was double the tonnage reported for the year 1946. Of this amount, 7,551 tons were used in glass manufacture, 7,257 tons as asphalt filler, and 6,552 tons for agricultural purposes. Smaller quantities were used as flux for steel manufacture, as rubble, as poultry grit, in coal mining and for miscellaneous uses. Much of this limestone was used in the pulverized form. It is estimated that the consumption of limestone for purposes other than cement, lime and rock wool manufacture is likely to increase to about 50,000 tons annually by 1975.

Limestone for cement manufacture is quarried at Exshaw, and at Cadomin, about 180 miles west of Edmonton. Lime plants operate at Summit in the Crowsnest Pass and at Kananaskis near Banff. A rock wool plant has operated at Gap, near Exshaw. Other smaller quarries supply local needs.

Clay and Shale: In Alberta, the only clay deposits which, so far, have been found satisfactory for commercial utilization are those of common clay. This clay is suitable for the manufacture of brick, structural tile, drain tile and such, but not for the manufacture of stoneware, ceramic ware or refractories.

For the manufacture of cement in Alberta, during 1956, about 140,000 tons of clay, shale and sand were used, of which the sand would be only a minor proportion. Shale for the cement plant at Exshaw is obtained from Seebe, seven miles away, and clay for the cement plant at Edmonton is obtained at the plant site.

Certain types of shale expand or become bloated

when heated and are used for the production of lightweight aggregate. Three plants manufacture lightweight aggregate or lightweight blocks in Alberta and obtain their shale from Priddis, Okotoks and Kananaskis. It is reported that, in 1955,^{**} 22,082 tons of shale were mined in Alberta for purposes other than the manufacture of cement, brick, tile or similar products. The major portion, if not the whole, of this production of shale was used for the manufacture of lightweight aggregate.

Currently, nine plants utilize Alberta clay and shale for the manufacture of brick and tile. They are located at Medicine Hat, Redcliff, Edmonton and Grande Prairie and use clay and shale obtained locally. Statistics on the amount of Alberta clay and shale used by these plants are not available but the quantity should increase appreciably in the future, as the total output of clay products in Alberta has shown a steady increase over the last 35 years.

Salt: Shipments of salt produced in Alberta amounted to 43,120 tons in 1957. In addition, an appreciable but unrecorded amount of salt brine was used for the manufacture of caustic soda and chlorine.

At the present time salt is produced in Alberta in one plant at Lindbergh. Brine for caustic soda-chlorine production is utilized in a plant at Two Hills, northeast of Edmonton. These two uses of salt—for table, direct consumption and for the production by electrolysis of caustic and soda and chlorine—are its major uses in Canada. In both cases, because of the widespread occurrence of salt throughout Canada and the high costs of transporting it and its products, markets for Alberta salt must be expected to be confined to the prairie area. The demand for the mineral will grow as local demands for salt, and for caustic soda and chlorine, continue to expand. Additional outlets would become available if sodium chlorate (made by electrolysis of fused salt) or soda ash (made from salt and lime) were produced in Alberta; both these products are good possibilities for Alberta manufacture at a future date.

Silica Sand: The deposit of high-grade silica sand in the Peace River area is of particular value to Alberta because its purity makes it suitable for glass-making. At present no silica sand is mined

* D.B.S. for Stone Industry, 1956, will be published in 1958.

** Latest figures available.

in Canada for making glass; all supplies are imported. Because cost of carriage is a more important consideration than one-site cost of silica sand, it should not be expected that Alberta sand will find markets outside the province. It may, however, eventually supply all the demands for glass sand in Alberta, and may also be used in asbestos compounds, refractory brick and many other uses.

Small quantities of sand were mined from the deposit in 1956 for use as molding sand in foundries. A glass fibre manufacturer at Fort Saskatchewan, which has obtained mineral rights to part of the deposit, has announced its intention of erecting a glass melting plant at Fort Saskatchewan to use Peace River sand for making glass to be used in its processes.

Iron Ore: Iron ore deposits in the Peace River district appear too low in grade and too distant for early utilization. Much planning has already been done with the object of developing the iron ore values near Burmis, in the Crowsnest Pass area. It must be admitted that the development of these deposits presents difficulties, the major one being sufficient markets for final outputs of a proposed steel and steel products mill. Those engaged in the project, however, are optimistic that their plans can soon be economically justified.

Future Utilization of Other Minerals

In addition to the minerals now being extracted, it may be expected that other non-fuel minerals will be utilized in Alberta within the next twenty years.

Considerable interest has been shown in the

bentonite deposits which occur in Alberta. A promising deposit near Busby, 35 miles northwest of Edmonton, is at present under exploration. Marl deposits containing from 50 to 90 per cent calcium carbonate occur in a number of locations and have potential commercial value as replacement for limestone in some of its applications. Of particular interest are marl deposits in the St. Albert and Big Lake areas near Edmonton. A company has been formed to manufacture cement using marl from the Big Lake area as principal raw material.

Kaolins, fireclays and stoneware clays are found in the Whitemud formation of Cypress Hills and may, in the future, find commercial utilization in the manufacture of ceramic ware and refractories.

Commercial deposits of potash have not as far been found in Alberta, but some rich deposits, associated with salt beds, are located in Saskatchewan near the Alberta border. Similar deposits may be discovered, at some future date, in Alberta.

Other minerals which may be utilized have been discussed in Chapter II under Economic Geology, and include gypsum, sodium sulphate, phosphate rock and pumicite.

It appears probable that a total output value of some \$40 millions may be reached in non-fuel mineral production in Alberta by 1975. In a territory so large, with its variety of geological formations, it is certain that new mineral deposits will be discovered and, in some cases, commercial exploitation will follow. Some such discoveries may very well come in drilling for oil and gas. An extension in the types of mineral activity in Alberta is assured, although it is difficult to forecast the exact lines of development.

PETROLEUM AND NATURAL GAS

Petroleum

Petroleum and natural gas have attained major importance in the Canadian economy as sources of energy and chemical raw materials. Over one-half the energy used by the nation comes from petroleum and natural gas. In 1957 Canadian demand for crude oil and products averaged 743,000 barrels per day, about three and one-half times as much as

in 1945. Domestic crude supplies, made available primarily through Alberta's role as the nation's main producer, (see Table VII) have met an increasing proportion of this growing demand.

Canadian wells are now capable of meeting in excess of 100 per cent of the nation's petroleum needs, but because of competitive supply factors production is held to considerably lower levels.

Thus, Canadian production of over 181 million barrels in 1957 was over 66 per cent of the nation's consumption of crude oil and products. Part of this

production was exported so that Canadian oil actually supplied 53.1 per cent of the national demand, compared with only 8.9 per cent in 1949.

TABLE VII

ALBERTA PRODUCTION OF PETROLEUM*
1936 - 1957

Year	Quantity (Thousand Barrels)						Per cent of Canadian Production	Value (Thousand Dollars)
1936 -	-	-	-	-	-	-	87.1	3,020
1937 -	-	-	-	-	-	-	93.5	4,961
1938 -	-	-	-	-	-	-	97.0	8,775
1939 -	-	-	-	-	-	-	96.5	9,362
1940 -	-	-	-	-	-	-	96.1	10,694
1941 -	-	-	-	-	-	-	98.2	13,986
1942 -	-	-	-	-	-	-	97.9	15,515
1943 -	-	-	-	-	-	-	96.0	15,725
1944 -	-	-	-	-	-	-	87.0	14,468
1945 -	-	-	-	-	-	-	94.0	13,170
1946 -	-	-	-	-	-	-	94.1	14,348
1947 -	-	-	-	-	-	-	88.0*	18,079
1948 -	-	-	-	-	-	-	89.5	35,128
1949 -	-	-	-	-	-	-	94.0	59,000
1950 -	-	-	-	-	-	-	96.1	82,216
1951 -	-	-	-	-	-	-	96.5	113,870
1952 -	-	-	-	-	-	-	96.2	139,512
1953 -	-	-	-	-	-	-	95.0	193,762
1954 -	-	-	-	-	-	-	91.8	228,319
1955 -	-	-	-	-	-	-	87.3	274,901
1956 -	-	-	-	-	-	-	83.7	355,174
1957 -	-	-	-	-	-	-	75.6	356,744

* Source: Canadian Mineral Statistics, D.B.S.

In the thirty years before 1947, about 2,000 wells were drilled in Western Canada, but only two significant fields were discovered—the Turner Valley field in Alberta, which is still a producer, and the smaller field at Fort Norman in the northwest Territories. The discoveries of the Leduc-Woodbend field in 1947 and the Redwater field in 1948 brought to fruition a long search for major oil reserves. By the end of 1957 there were about 8,000 crude oil wells capable of being operated, and the production of crude oil for the year 1957, averaged 376,691 barrels per day, over 20 times the average daily crude oil production before these discoveries. Production of 137.5 million barrels of crude oil in 1957 was 20 times as great as production in 1946. By the end of 1957, a cumulative total of 812 million barrels had been produced in Alberta and one estimate placed the remaining reserves of discovered fields at 2,700 million barrels.

Although there are more than 70 oil fields in the province, with some 60 presently producing, the bulk of production comes from a few of these fields. Table VIII giving crude oil production by major fields, shows that for the period 1947-1957, 47.8 per cent of oil produced came from two fields alone—Redwater and Leduc-Woodbend. These two fields dominated oil production from 1949 to 1954, but in 1955 the Pembina field, discovered in 1953, began to forge ahead. By August, 1956, Pembina was first with 24.3 per cent of the monthly allowable production.

The total value of oil production in Alberta to the end of 1956 was some \$1,800 million. Of particular significance to the provincial economy is the total amount spent in locating and producing this oil. By the end of 1955, \$1.2 billion had been spent in Western Canada in exploration and a further \$1.1 billion in development and production costs.* Probably some ninety per cent of the total was spent within Alberta. This does not include investment in transportation, refining and marketing facilities which may have amounted to a further one billion dollars. Direct employment in the exploratory and development phases of the oil industry in Alberta has varied in recent years between 12,000 and 18,000 persons while the total population supported in Alberta by the re-spending of oil expenditures would be many more.

In Alberta, mineral rights to over 80 per cent of the area of the province are owned by the Alberta

Government. From 1947 to early 1957, the Alberta Government had realized \$625 million in petroleum and natural gas revenues. The revenues from oil and gas are produced at various stages of the development process. In general, a company may first acquire a block of land under reservation, for which it pays a bonus or fee and a deposit. If after exploration the company believes it has discovered a favourable structure, it may take out a lease on not more than half the original block, the rest of the area to be leased to other companies by sealed tender. Finally, when oil or gas is produced, a royalty is paid to the Government.

Marketing of Alberta oil has posed, and will continue to pose problems. Crude oil production potential has increased at a rate considerably in excess of demand, requiring the establishment of a production quota for each well. In 1948 crude oil production was 100 per cent of potential production, but since that year production has varied from 51 to 70 per cent of potential. In December, 1957, potential production was 787,000 barrels per day while allowable production was only 299,000 barrels, about 38 per cent of the potential.

The location of competing sources presently limits the markets of Alberta oil to certain regions of North America. Until 1951, Alberta crude was marketed within the province itself and the neighbouring provinces of Saskatchewan and Manitoba. In 1950 the Interprovincial pipeline was completed from Edmonton to Superior, Wisconsin. Lake tankers brought Alberta oil to central Ontario, which began to take major quantities. As the line was extended eastward, oil was brought directly by pipeline to Sarnia, Ontario, and in March, 1956, initial deliveries of Canadian crude were made to Michigan. Late in 1957 an extension to Toronto was completed. The rated throughput of the line out of Edmonton in 1957 was 247,000 barrels per day.

A further pipeline outlet is the 718 mile Trans Mountain pipeline from Edmonton to Burnaby (near Vancouver, B.C.) built in 1952 and 1953, which gave access to the British Columbia market. In 1954 and 1955 the line was extended to Emeraldale, Washington, and to Anacortes, Washington, making available the Puget Sound area of the United States, now an important consumer of Alberta oil. The capacity of this line is now 250,000 barrels per day. Beginning in January, 1956, here

* Estimated total expenditures to the end of 1957 are \$2.7 billion for exploration and development with 80% spent in Alberta.

TABLE VIII

ALBERTA PETROLEUM PRODUCTION BY MAJOR FIELDS*, 1947-1957

(Thousand Barrels)

Field	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	Total 1947-57
Turner Valley -	-	4,432.1	3,826.5	3,344.0	2,952.3	2,655.0	2,405.0	2,137.9	2,056.4	1,776.4	1,595.1	32,203.1
Leduc-Woodbend -	-	4,657.4	9,687.7	10,590.5	13,743.1	17,849.5	21,360.5	20,560.8	20,421.3	21,097.7	18,295.3	158,636.2
Lloydminster -	-	648.1	716.9	809.8	900.5	1,057.4	1,059.6	1,101.2	1,221.5	1,091.5	895.0	9,805.7
Redwater -	-	36.9	4,793.5	10,745.5	23,177.6	23,975.8	23,281.6	24,896.0	28,506.5	28,182.3	21,184.6	188,780.3
Joachim -	-	-	35.9	168.9	791.0	2,342.2	4,637.9	4,858.7	4,792.9	4,540.3	4,259.2	26,427.0
Fenn Big Valley -	-	-	-	10.2	165.2	1,076.1	3,203.7	6,492.7	7,546.7	8,028.8	7,798.4	34,321.8
Bonnie Glen -	-	-	-	-	-	743.5	5,550.7	6,960.3	7,826.6	10,279.2	8,176.1	39,536.4
Pembina -	-	-	-	-	-	-	39.3	852.8	14,850.3	33,701.3	37,185.5	86,629.2
Acheson -	-	-	-	51.4	918.2	2,016.9	2,497.8	2,756.2	2,698.5	2,579.5	2,346.7	15,865.2
Joffre -	-	-	-	-	-	-	28.8	566.4	1,690.1	3,331.1	3,211.8	8,830.8
West Drumbeller -	-	-	-	-	-	11.9	539.6	1,089.7	1,227.7	1,397.0	1,460.7	5,726.6
Westrose -	-	-	-	-	-	98.1	930.1	1,372.2	1,742.3	2,317.5	1,781.0	8,241.2
Wizard Lake -	-	-	-	-	190.6	1,696.1	3,095.3	3,706.9	3,720.0	4,824.0	4,377.1	21,610.0
Excelsior -	-	-	1.6	272.2	723.0	933.6	1,060.6	1,163.6	1,084.6	1,004.6	758.7	7,002.6
Golden Spike -	-	-	85.1	292.9	641.0	1,279.1	2,167.6	2,549.5	3,400.5	3,941.6	2,520.7	16,878.0
Stettler -	-	-	15.7	246.2	606.1	607.1	438.0	897.2	1,832.8	2,119.5	2,027.5	8,790.1
Sturgeon Lake South -	-	-	-	-	-	-	15.8	70.2	680.6	1,962.9	2,637.0	5,366.5
Total Major Fields -	-	5,699.0	19,162.9	26,531.6	44,808.6	56,342.3	72,311.9	82,032.4	105,301.9	132,175.2	120,510.4	674,650.7
Total Remaining Fields -	-	683.1	604.9	617.8	1,106.7	2,576.7	4,504.5	5,604.7	7,791.6	11,734.4	16,981.9	52,878.3
Total, All Fields -	-	6,382.1	19,767.8	27,149.4	45,915.4	58,919.0	76,816.4	87,637.1	113,035.0	143,909.6	137,492.3	727,529.0

* Fields which have produced one million barrels or more in any one year of 1947-1957.

TABLE IX

ALBERTA PETROLEUM SALES, 1948-1957

(Thousand Barrels)

To:	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Alberta Refineries	-	-	-	-	-	-	18,247	20,800	23,630	23,470
Alberta Miscellaneous	-	-	-	28	35	51	211	95	8	57
British Columbia	-	-	-	-	509	2,680	13,464	19,328	21,894	22,300
Saskatchewan	-	-	-	11,084	11,854	14,372	13,708	12,761	12,903	14,126
Manitoba	-	-	-	4,585	6,091	5,541	5,219	6,084	4,781	5,990
Ontario	-	-	-	13,666	19,972	23,439	34,116	36,325	43,743	33,840
U.S.A. - Great Lakes	-	-	-	463	1,117	2,192	1,665	3,329	11,107	6,098
U.S.A. - Puget Sound	-	-	-	-	-	-	909	11,364	19,211	27,094
U.S.A. - South	-	-	-	-	-	-	-	-	33	72
Vancouver Marine Terminal	-	-	-	-	-	-	-	-	6,230	7,141
Total	-	-	-	45,046	57,935	67,723	87,539	110,086	143,540	140,188

have been tankerload shipments of Alberta crude from the West Coast terminal of the Trans Mountain pipeline to the Californian market. However, fluctuating tanker rates greatly affect the Californian market and cause great variations in the sale of Alberta crude there from one period to another.

The present market pattern for Alberta crude oil is shown in Table IX. The data for sales in previous years indicate that an attempt to forecast markets by simple projection from past sales would be unwarranted.

The Montreal market, with a refining capacity of 5,000 barrels per day, over one-third of total Canadian capacity, is the largest remaining market in Canada using imported crude. Alberta crude is presently at a price disadvantage compared to Venezuelan crude in this market, but changes in tanker rates introduction of an import quota system or changes in world crude prices would alter this situation.

Some petroleum products refined in Montreal are shipped to eastern Ontario and Toronto. Rising demand in this area, as well as in Quebec, led the Interprovincial Pipe Line Company to extend its line from Sarnia to Toronto in 1957. Refining capacity at Toronto has recently been increased, and when current projects are completed will total 85,500 barrels per day.

In the United States the Pacific Northwest may prove the largest market for Alberta crude, and if Canadian crude can maintain a price advantage over Venezuelan and other foreign crudes there could be a large future market here. Refinery capacity at October, 1957, was some 111,000 barrels per day, an increase of 24,000 barrels per day over the past two years, and additional capacity of 100,000 barrels per day is proposed in this area.

Shipments of crude have been made to the San Francisco area, which had a refinery capacity of 455,000 barrels per day in 1955, and is also partly supplied by imports from the Middle East and Far East as well as by Californian crude. Two other important parts of the United States where crude must be brought from outside the area are the Lakehead and north Michigan districts. Canadian crude laid down at St. Paul, Minnesota, had a price advantage over directly-shipped United States crude, and it is also cheaper than United States crudes trans-shipped from Chicago. The Minneapolis Lakehead

market is estimated at some 215,000 barrels per day and Canadian crude has so far made only a small contribution toward meeting this demand.

The Michigan district includes the centres of Detroit, Toledo, and Bay City, with total markets approximating 366,000 barrels per day supplied by mid-continent crude. While this district is traversed by the Interprovincial pipeline, Canadian crude is not expected to make significant inroads into this market in the foreseeable future. Shipments to small refineries in northern Michigan, however, were initiated in 1956.

The demand for Western Canadian crude is thus made up of two major markets—a domestic market whose future demand can be more readily estimated, and an export market where competing sources, possibility of trade restrictions, and shifts in market areas make the outline of future conditions less certain. Canada's demand for crude oil and products is expected to increase from its 1956 level of 720,000 barrels per day to about 1.5 million barrels per day by 1975. About 30 per cent of this demand—that of Quebec and the Maritimes—may still use imported crude, which would leave a domestic market for Canadian crude of about 1.05 million barrels per day. Venezuelan crude will probably be diverted increasingly to the United States market and become more expensive in Montreal. Alberta oil may therefore find some outlet in Montreal, resulting in a demand for domestic oil much closer to total national demand.

The future of Canadian oil is closely related to the development of markets in the United States. In that country the trend to increasing consumption and reduced rate of discovery is bound to lead to growing imports. In 1945 the United States became a net crude oil importer, and now imports at a rate of over one million barrels per day. This growing importation of oil, coupled with the likelihood that United States crude oil production will reach its peak about 1970, promises a major market for Canadian oil. Current United States consumption of 8.6 million barrels per day of oil is expected to increase to some 12.2 million barrels per day by 1975. If the trend of past imports continues, these will reach roughly three million barrels per day in that year. Of this figure, Canada may expect to supply 600,000 barrels per day. This would bring the total demand for Canadian crude oil within a range of 1,650,000 barrels per day to 2,100,000 barrels per day by 1975.

Not all of this demand will be met by crude oil production in Alberta. Crude oil will also come from Manitoba, Saskatchewan, and northeastern British Columbia. Oil exploration is also underway in the St. Lawrence Lowlands in the vicinity of Montreal and in the Maritimes. At the present time, however, it appears that Saskatchewan and Manitoba will be the only provinces other than Alberta to contribute substantially to Canadian production.

It is expected that Alberta's oil production will be within a range of 1,350,000 barrels per day to 1,760,000 barrels per day by 1975, and probably closer to the upper limit. These forecasts are essentially conservative, for there is a possibility that Canadian oil will obtain significant shares in the Chicago and Detroit-Toledo-Bay City markets. At the moment Canadian oil is at the margin of economic competition in these areas, and would have to cross economic and political hurdles to enter these markets. Western Canada is one of the lowest cost North American oil areas today, and may reasonably be expected to continue to be, so that the increases in United States oil prices that are expected to occur before 1975 might overcome these barriers. At the present times, these areas use some 800,000 barrels per day, and following national trends this could increase to 1,200,000 barrels per day by 1975. This may therefore add considerably to the market for Canadian oil, but much will depend on the marketing policies of major oil companies and the import policy of the United States Government.

Considering all these factors, it is believed that Alberta petroleum production by 1975 may be conservatively estimated at 1,700,000 barrels per day, some 5.5 times 1955 production.

If a conservative estimate of discovery rate and of potential discoverable reserves is adopted then it could be predicted that, at this rapidly increasing rate of utilization, remaining reserves would begin to decrease between 1965 and 1970. Such a situation would be likely to result in a curtailment of production to lower levels than are forecast, but many authorities believe that total virgin reserves will eventually far surpass present estimates.

Natural Gas

In 1957, Alberta produced 179 billion cubic feet

of natural gas, or 89 per cent of total Canadian production of 200 billion cubic feet, excluding field waste. Over the last ten years, Alberta's output has varied between 83 per cent and 89 per cent (Table X) of the national total; over the same period natural gas consumption in Canada has tripled so that in 1955 it accounted for almost five per cent of Canada's primary energy consumption.

Alberta natural gas production has grown steadily, accelerating since 1949, although it has not paralleled the more spectacular rise in crude oil production. The value of natural gas marketed in 1956 in Alberta was only 2.75 per cent of the total value of mineral production in the province, and this share was less than in the years preceding 1954. Much of the reason is to be found in the relatively slower development of outlets for natural gas than for petroleum.

In 1955 Alberta wellhead gas prices averaged over 7.5 cents per thousand cubic feet. Table XI giving delivered gas prices, shows that consumers of natural gas in Western Canada, mainly in Alberta, enjoy a very favourable price compared with prices charged in Eastern Canada. Even with 1957 wellhead prices in excess of 13 cents per thousand cubic feet this situation will still continue. With an average consumers' price less than one-fifth that of Eastern Canada, the West consumed more than five times the quantity marketed in the East. Sales of Alberta natural gas in Eastern Canadian markets will still leave a significant price differential in favour of western consumers because of the cost of transporting this gas to the East.

Over half of Alberta's 1956 production came from six major fields and the major present producer, Turner Valley, gave almost 30 billion cubic feet. Recent trends are toward increasing production from other fields, and toward the linking of major industrial establishments to individual gas fields for fuel and raw material requirements. As examples, the Canadian Chemicals plant at Edmonton obtains gas from the Morinville field, and the Sherritt Gordon plant has obtained large quantities from the Fort Saskatchewan field. Clay product factories in Medicine Hat have long been using local gas. Current and proposed industrial development is continuing this trend as the value of available natural gas from a controlled adjacent field is increasingly realized. A new fertilizer plant at Medicine Hat and the Calgary Power plant at Wabamun are examples.

TABLE X

GROSS MARKETED PRODUCTION OF NATURAL GAS IN ALBERTA,
1936-1957

(Millions of Cubic Feet)

Year					Volume	Per cent of Canadian Production	Year					Volume	Per cent of Canadian Production
1936	-	-	-	-	17,408	61.9	1947	-	-	-	-	44,107	83.8
1937	-	-	-	-	20,956	64.8	1948	-	-	-	-	48,965	83.6
1938	-	-	-	-	21,822	65.3	1949	-	-	-	-	51,180	84.7
1939	-	-	-	-	22,514	64.0	1950	-	-	-	-	58,604	86.4
1940	-	-	-	-	27,460	66.6	1951	-	-	-	-	69,877	87.9
1941	-	-	-	-	30,905	71.1	1952	-	-	-	-	79,150	89.2
1942	-	-	-	-	34,483	75.5	1953	-	-	-	-	89,652	88.8
1943	-	-	-	-	35,569	80.3	1954	-	-	-	-	107,174	88.8
1944	-	-	-	-	37,162	82.5	1955	-	-	-	-	133,007	88.2
1945	-	-	-	-	40,393	83.4	1956	-	-	-	-	146,134	86.2
1946	-	-	-	-	40,097	83.7	1957	-	-	-	-	179,532	89.0*

Preliminary estimate.

TABLE XI

SALES OF NATURAL GAS IN 1956

								Volume (millions of cubic feet)	Value (\$'000)	Average Delivered Price per Thousand Cubic Feet (\$)
<i>Eastern Canada</i>										
Domestic	-	-	-	-	-	-	-	17,953	25,616	1.43
Industrial	-	-	-	-	-	-	-	5,086	5,266	1.04
Commercial	-	-	-	-	-	-	-	3,547	4,984	1.41
Miscellaneous	-	-	-	-	-	-	-	84	82	0.98
Total	-	-	-	-	-	-	-	26,670	35,948	1.35
<i>Western Canada</i>										
Domestic	-	-	-	-	-	-	-	34,086	13,877	0.41
Industrial	-	-	-	-	-	-	-	60,545	8,349	0.14
Commercial	-	-	-	-	-	-	-	22,351	6,461	0.29
Miscellaneous	-	-	-	-	-	-	-	73	18	0.25
Total	-	-	-	-	-	-	-	117,055	28,705	0.25

Until the end of 1950 all marketed gas was sold within the province. Small quantities were exported to Dawson Creek in British Columbia in 1951 and to Montana starting in 1952. Reserves have since grown rapidly, assuring Alberta consumers of gas availability for the foreseeable future. More attention has been given since 1955 to the development of markets outside the province.

In 1955 arrangements were completed for the marketing of Peace River area natural gas by Westcoast Transmission Company Limited, over a 650 mile, 30 inch pipeline from the Peace River area to British Columbia centres. This line, continued to the national border, is being linked with an American gas line from the San Juan area of New Mexico. The reserves from these two areas will thus find markets not only in British Columbia but possibly in the Pacific northwest states, California, and the Rocky Mountain states. The Westcoast Transmission line completed in October, 1957, provides a market for up to 1,080 billion cubic feet over a 20 year period, or 56 billion cubic feet per year of Alberta gas, in addition to the gas obtained from British Columbia fields. An application before the Alberta Petroleum and Natural Gas Conservation Board in 1958 indicates there is a great demand for Alberta gas in California.

The major outlet to eastern markets will be secured through the Trans-Canada pipeline which will supply the major markets as far as Montreal. Construction of the pipeline was started in the summer of 1956 and will be completed in 1958. At present it is authorized a maximum Alberta gas withdrawal rate of 620 million cubic feet per day, with a total 25 year reserve allowance of 4.35 trillion cubic feet. To assist in the marketing of this gas, negotiations have been undertaken with an American gas transmission company which plans to import 200 million cubic feet per day at Emerson, on the Manitoba-Minnesota border, and deliver 86.7 million cubic feet per day at Niagara to help build up the Ontario and Quebec markets.

The local and export markets for Alberta gas may be expected to develop at somewhat different

rates. The major consuming centres in the local market area are already supplied by gas, so that production marketed in Alberta will parallel the growth of the provincial economy. By 1960 there could be a very rapid rise in gas exports, as the major gas lines are completed and are sending Alberta gas to important consuming centres on the Pacific coast and in the east.

Probable future consumption of Alberta natural gas in the United States cannot be estimated by any simple comparison of projected United States consumption with probable future reserves in that country, which proved a useful method in the discussion of petroleum markets. The question of future gas costs, which may be expected to increase in the United States more rapidly than in Alberta, complicates the discussion and adds a further element of uncertainty to any forecast.

It may be argued that several recent forecasts of probable future Alberta reserves have been conservative. Alberta's gas reserves in 1957 stood at over 21 trillion cubic feet. It would appear reasonable to estimate discoveries at an average of at least 2.5 trillion cubic feet per year over the next 20 years, and very liberal to estimate withdrawals at an average one trillion cubic feet per year. These estimates would indicate 45 trillion cubic feet of remaining reserves by 1975. If utilization by that time was the rate of 1.35 trillion cubic feet per year, more than 33 years' supplies would remain underground—a reserve regarded as more than adequate by present standards.

It is believed that the following minimum prediction is justified:

Alberta Natural Gas Utilization, 1975						Billions of Cubic Feet
In Alberta	-	-	-	-	-	50
In Canada (other provinces)	-	-	-	-	-	50
In United States	-	-	-	-	-	50
Total	-	-	-	-	-	1,550

CHAPTER V

ALBERTA'S MANUFACTURING INDUSTRIES

	Page
Growth of Manufacturing in Alberta	173
Industry Groups and Individual Industries	183
Foods and Beverages	184
Petroleum and Coal Products	196
Wood Products	198
Iron and Steel Products	198
Chemical and Allied Products	200
Non-Metallic Mineral Products	204
Printing and Publishing Industries	205
Transportation Equipment	205
Pulp and Paper Products	206
Clothing	206
Textiles	207
Non-Ferrous Metal Products	207
Electrical Apparatus and Supplies	208
Leather Products	208
Knitting Mills	208
Miscellaneous Industries	209
Summary of Predictions of Growth	209

CHARTS AND MAPS

Manufacturing in Alberta Gross Production Values 1917-56	175
Gross Value of Manufacturing Alberta 1939-56	177
Manufacturing Industries of Canada — Employees Percentage Change 1939-56	179
Manufacturing Industries of Canada — Earnings Percentage Change 1939, 1954 and 1956	181
Manufacturing Industry Groups in Alberta (Based on Selling Value 1956)	185
Manufacturing Industries of Canada Value Added by Manufacture Percentage Change 1939-56	187
Leading Manufacturing Industries in Alberta Gross Value of Production 1943-56	189
Forecast of Principal Manufacturing Industry Groups Alberta 1975	211
Principal Manufacturing Industries in Alberta Forecast of Average Annual Growth Rate 1955-1975	213

TABLES OF INFORMATION

Table I	Manufacturing in Alberta and Canadian Regions 1929-56	174
Table II	Gross Value of Manufacturing in Alberta	183
Table III	Manufacturing Industries in Alberta — Value of Production in 1949 and 1956	191
Table IV	Manufacturing Production in Alberta — 1975 Forecast	210

CHAPTER V

ALBERTA'S MANUFACTURING INDUSTRIES

At this point the manufacturing industries—users of basic resources, customers of the resource industries, and workers with imported materials—may be considered. This chapter discusses the growth of the present structure and the future of manufacturing in Alberta. But it must be stressed that here the emphasis is on existing manufactures. Their prospects are reviewed, and a general overall forecast of Alberta manufacturing output in 1975 is derived toward the end of the Chapter. The reader is also referred, however, to two later Chapters—VII and VIII—where the emphasis is on the future rather than on the past and present, and

where forecasts are provided in more detail and the reasoning behind them more fully explored.

The statistics for 1955 are generally used throughout this Chapter. It happens to be the last year for which a breakdown is available at the time of printing.

1956 D.B.S. preliminary figures have been included in Table III and where 1957 Alberta Bureau of Statistics estimates are available, suitable footnotes have been provided. They are intended as a reliable guide.

THE GROWTH OF MANUFACTURING IN ALBERTA

Since 1940, the output of Alberta manufacturing industries has grown at an unprecedented rate. War demands, the postwar boom, and then the impetus given the whole economy, have produced an increase in gross value of manufactures from \$107 million (1940) to \$702 millions (1956), and an estimate of \$752 million for 1957.—growth at a more rapid rate than in the Prairie Provinces combined, in all of Western Canada, or Canada as a whole. (Table I gives figures for a net value of production)

In the past, Alberta manufacturing, like the economy of Alberta as a whole, was largely dependent on agriculture; agricultural raw materials provided the basis for the most important industries. Through 1948 Foods and Beverages production accounted for more than 60 per cent of total manufacturing output in the province. Then, beginning in 1949, the pattern of manufacturing in Alberta was radically altered as a result of the exploitation of major oil and gas resources. The Foods and Beverages group, while continuing in the lead, declined in importance relative to manufacturing as a whole. More recently, with the founding of important new firms in the metals and wood pulp industries manufacturing has become even more diversified—a trend which is expected to continue.

Gross values of production, which are quoted,

reflect year-by-year changes in price as well as quantity. Production values in constant (1954) dollars have been computed and are set out in Table II, together with current dollar values for recent years. The constant dollar values show a rise in output through 1945, when the war in Europe terminated. During the next five years volume of output remained fairly constant. In 1950 an upward trend became noticeable, and in 1952 there began a rapid expansion which has since continued. This indicates a time lag of some four years between the discovery of the Leduc oil field and the expansion in manufacturing capacity which followed the recognition of Alberta's great petroleum wealth.

Concurrently, manufacturing also increased its share in the total output of the province. The percentage of net value of manufacturing production to net value of total production in the province has been as follows:

Year	1949	1950	1951	1952	1953	1954	1955	1956
Per cent -	15.7	16.9	14.1	16.8	17.0	19.6	20.7	19.4

The 1956 increase is considerable. It parallels percentage rises in the contribution to the provincial total by mining and construction. This has brought a decrease in the share contributed by agriculture.

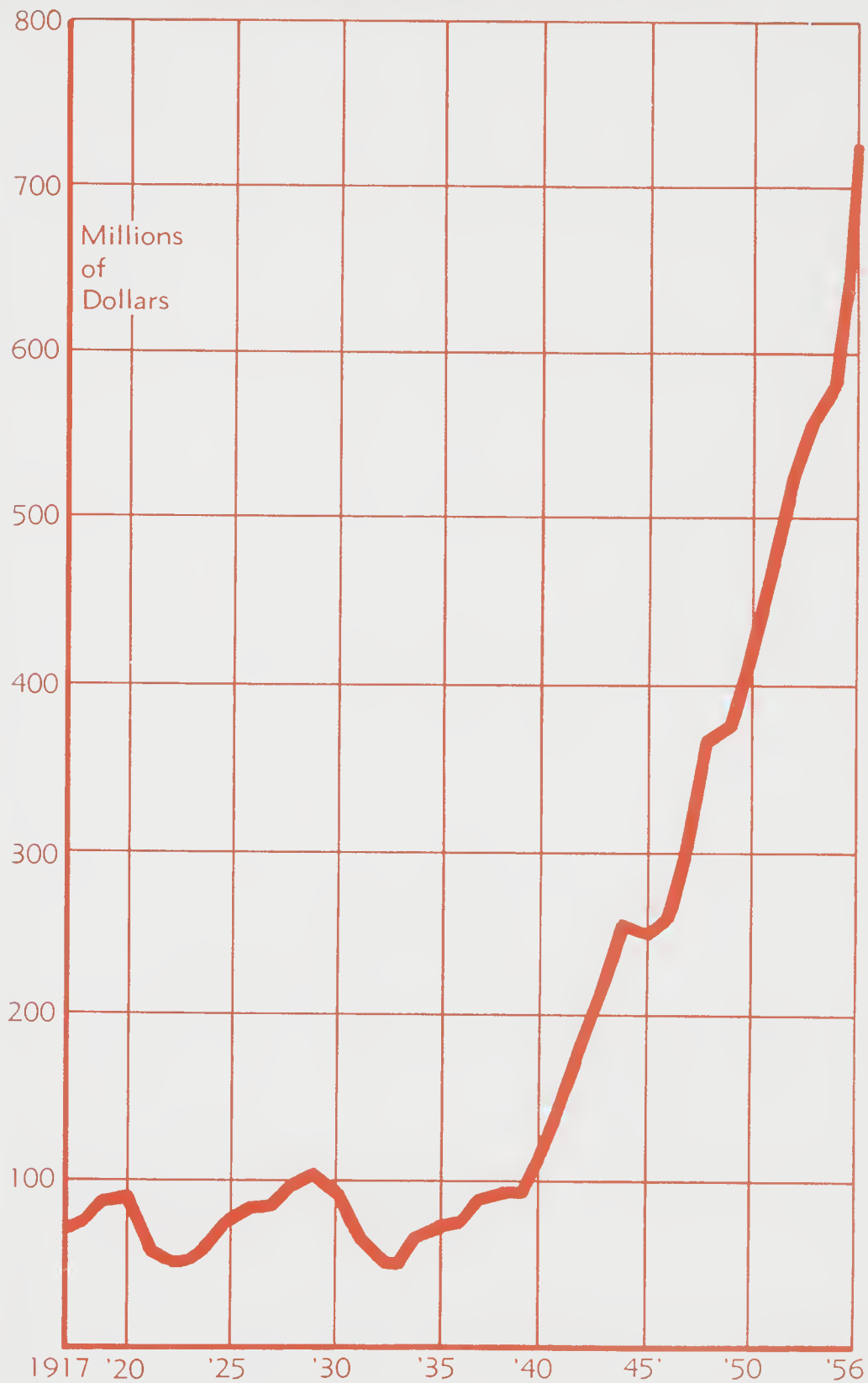
TABLE I

MANUFACTURING IN ALBERTA AND CANADIAN REGIONS, 1929-1956

Year	Alberta			Prairie Provinces		Western Canada*		Canada	
	Net Value of Manufactures	\$000		Net Value of Manufactures	Alberta Proportion Per cent	Net Value of Manufactures	Alberta Proportion Per cent	Net Value of Manufactures	Alberta Proportion Per cent
1929	-	-	-	123,753	29.8	236,835	15.5	1,755,387	2.1
1933	-	-	-	67,746	27.9	126,781	14.9	919,671	2.1
1939	-	-	-	101,712	32.1	205,067	15.9	1,531,052	2.1
1944	-	-	-	238,589	32.4	576,007	13.4	4,015,776	1.9
1948	-	-	-	309,604	34.6	727,585	14.7	4,938,787	2.2
1949	-	-	-	329,373	34.8	739,643	15.5	5,330,566	2.2
1950	-	-	-	350,440	35.4	830,615	14.9	5,942,058	2.1
1951	-	-	-	395,588	35.8	988,796	14.3	6,940,947	2.0
1952	-	-	-	475,969	37.4	1,033,164	17.3	7,443,533	2.4
1953	-	-	-	509,398	39.2	1,126,096	17.7	7,993,069	2.5
1954	-	-	-	556,376	39.4	1,210,045	18.1	7,902,124	2.8
1955	-	-	-	613,132	43.0	1,361,948	19.3	8,797,941	3.0
1956	-	-	-	693,517	40.0	1,544,288	18.1	9,630,722	2.7

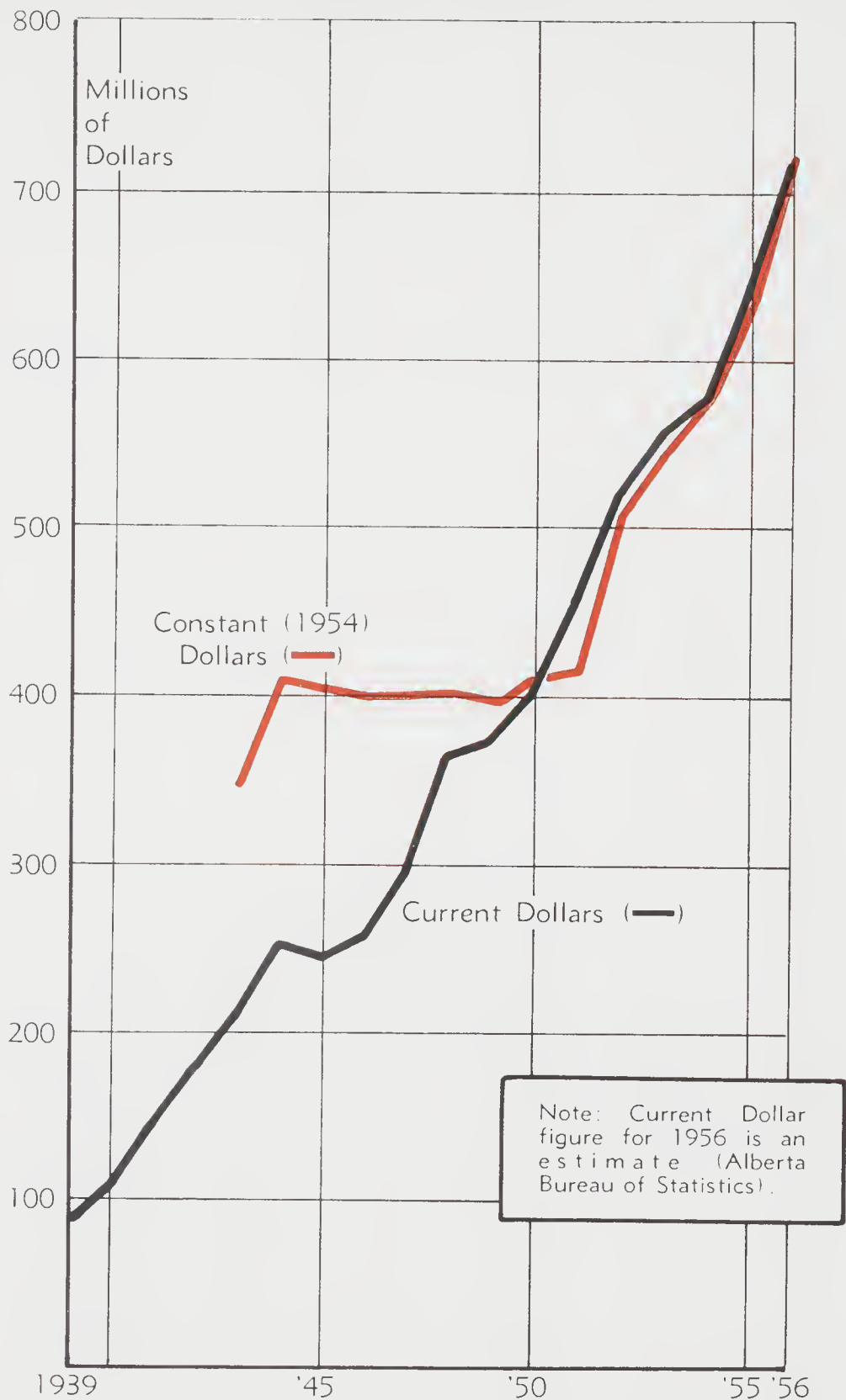
* Manitoba, Saskatchewan, Alberta, and British Columbia, Northwest Territories and Yukon, except for 1929 and 1933 figures which exclude Northwest Territories.

MANUFACTURING IN ALBERTA GROSS PRODUCTION VALUES 1917-56*

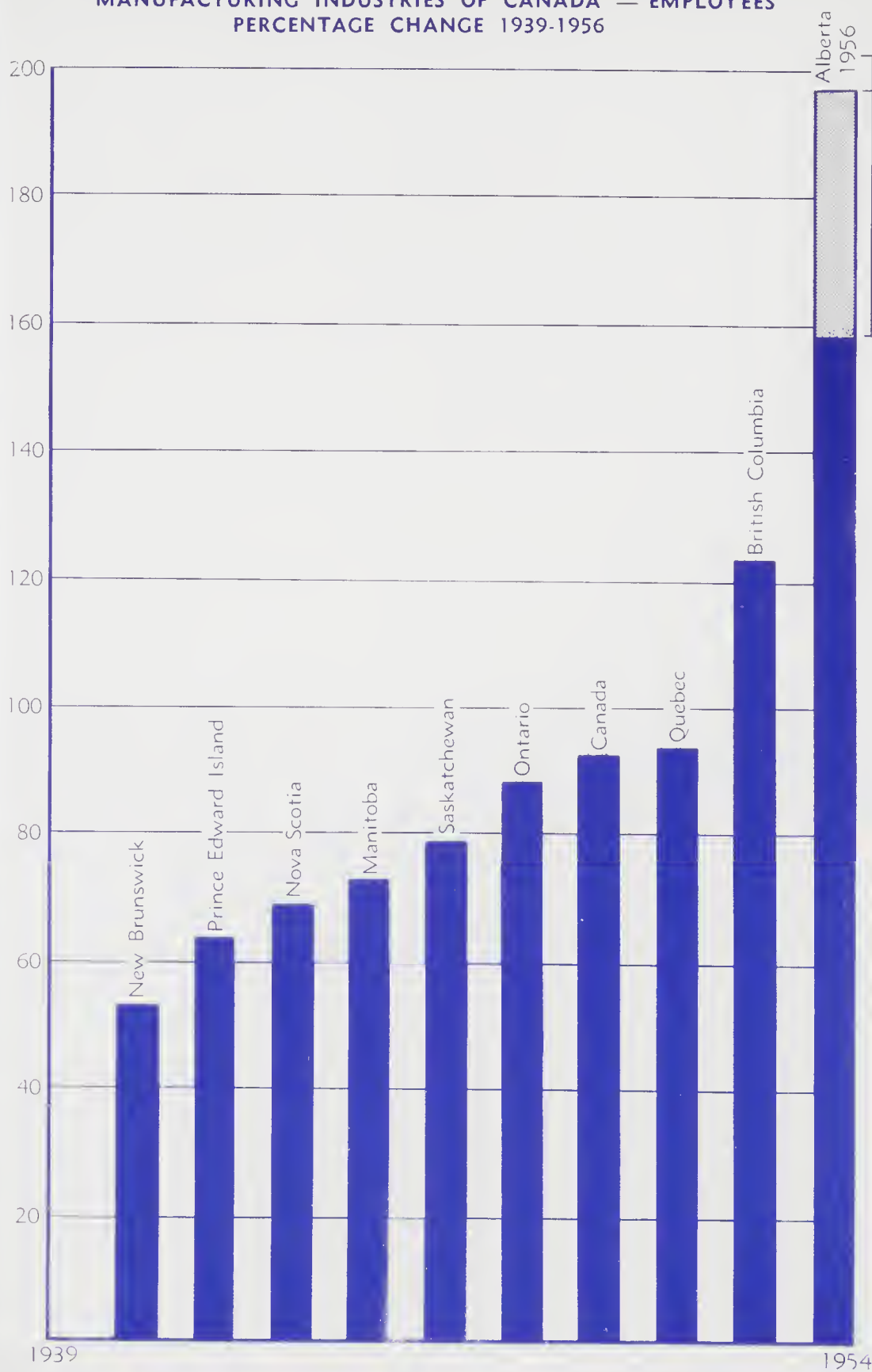


* 1956: Estimate.

GROSS VALUE OF MANUFACTURING ALBERTA 1939-56



MANUFACTURING INDUSTRIES OF CANADA — EMPLOYEES
PERCENTAGE CHANGE 1939-1956



MANUFACTURING INDUSTRIES OF CANADA — EARNINGS PERCENTAGE CHANGE 1939-1956

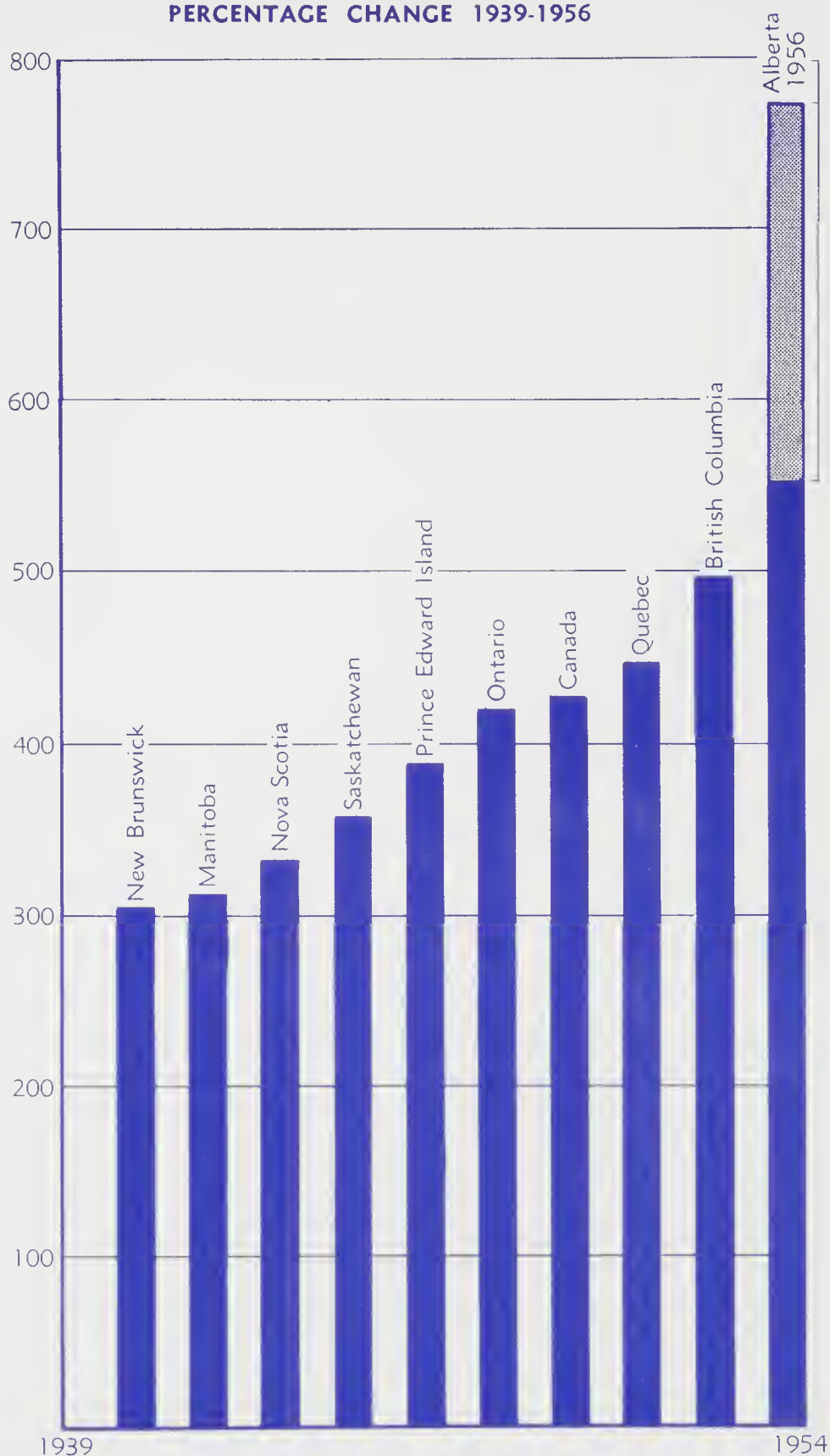


TABLE II

GROSS VALUE OF MANUFACTURING
IN ALBERTA

Year	Current Dollars (Millions of Dollars)	Constant (1954) Dollars (Millions of Dollars)
1943	- - 211	347
1944	- - 253	409
1945	- - 248	402
1946	- - 257	399
1947	- - 296	400
1948	- - 366	401
1949	- - 372	398
1950	- - 403	411
1951	- - 458	414
1952	- - 518	505
1953	- - 556	547
1954	- - 575	575
1955	- - 641	626
1956	- - 702	721
1957	- - 752°	—

* Alberta Bureau of Statistics Estimated Figures.

Alberta led all Canadian provinces in the rate of increase of manufacturing employment, earnings, and value added by manufacture between 1939 and 1956. During this period of 17 years, including wartime expansion and postwar development, employment increased by 196 per cent, earnings by 708 per cent, and the value of factory shipments (i.e. gross manufacturing value) by 702 per cent.

Per capita value of manufacturing production has also risen, and by 1956 had reached \$625 per person. The comparable figure for all of Canada was \$1,359. This reveals that, although Alberta's economy is becoming more orientated toward manufacturing, she will probably continue for some years to have higher relative production in the extractive industries and in the construction industry than the country as a whole. It is estimated that by 1975 the annual per capita gross production value of manufacturing in the province will be \$900—slightly less than the 1953 average for Canada. This figure is based on the forecast of gross manufacturing production in Alberta in 1975 of two billion dollars, and 1975 Alberta population forecast of 2.2 million.

INDUSTRY GROUPS AND INDIVIDUAL INDUSTRIES

In 1955 the three largest Alberta manufacturing groups, accounting for some seventy per cent of total manufacturing sales values, were Foods and Beverages (42.6 per cent), Petroleum and Coal Products (18.1 per cent), and Wood Products (8.9 per cent). Nearly seventy per cent of manufacturing output, therefore, was from industries using raw materials derived from Alberta farms, ranches, minerals and forests. In 1957 Foods and Beverages lead with 40.5 per cent, Petroleum and Coal Pro-

ducts with 18 per cent, Iron and Steel 8.4 per cent, and Wood Products 7.4 per cent.*

Among the individual industries making up the groups, two predominate: Slaughtering and Meat Packing, and Petroleum Products. All individual industries which contributed one per cent or more to total manufacturing output are shown in the following tabulation:

* Alberta Bureau of Statistics Estimate.

GROSS SELLING VALUE OF LEADING INDUSTRIES AS PERCENTAGE OF ALL MANUFACTURES OF ALBERTA

Industry	Per cent	
	1955	1956
Slaughtering and meat packing - - -	20	19
Petroleum products - - - -	18	19
Butter and cheese - - - -	6	5
Flour Mills - - - -	5	5
Sawmills - - - -	4	3
Sash, door, and planing mills - -	3	3
Bread and other bakery products -	3	3
Railway rolling stock - - - -	2	3
Breweries - - - -	2	2
Printing and publishing - - -	2	2
Concrete products - - - -	2	2
Bridgebuilding and structural steel -	2	2
Miscellaneous food preparations -	1	2
Prepared feeds - - - -	1	1
Clothing — men's factory - - -	1	1
Sheet metal products - - - -	1	1
Other industries - - - -	27	27
	100	100

The 1955 and 1956 selling values on which the above table is based are shown in Table III together with considerable further detail of all individual industries.

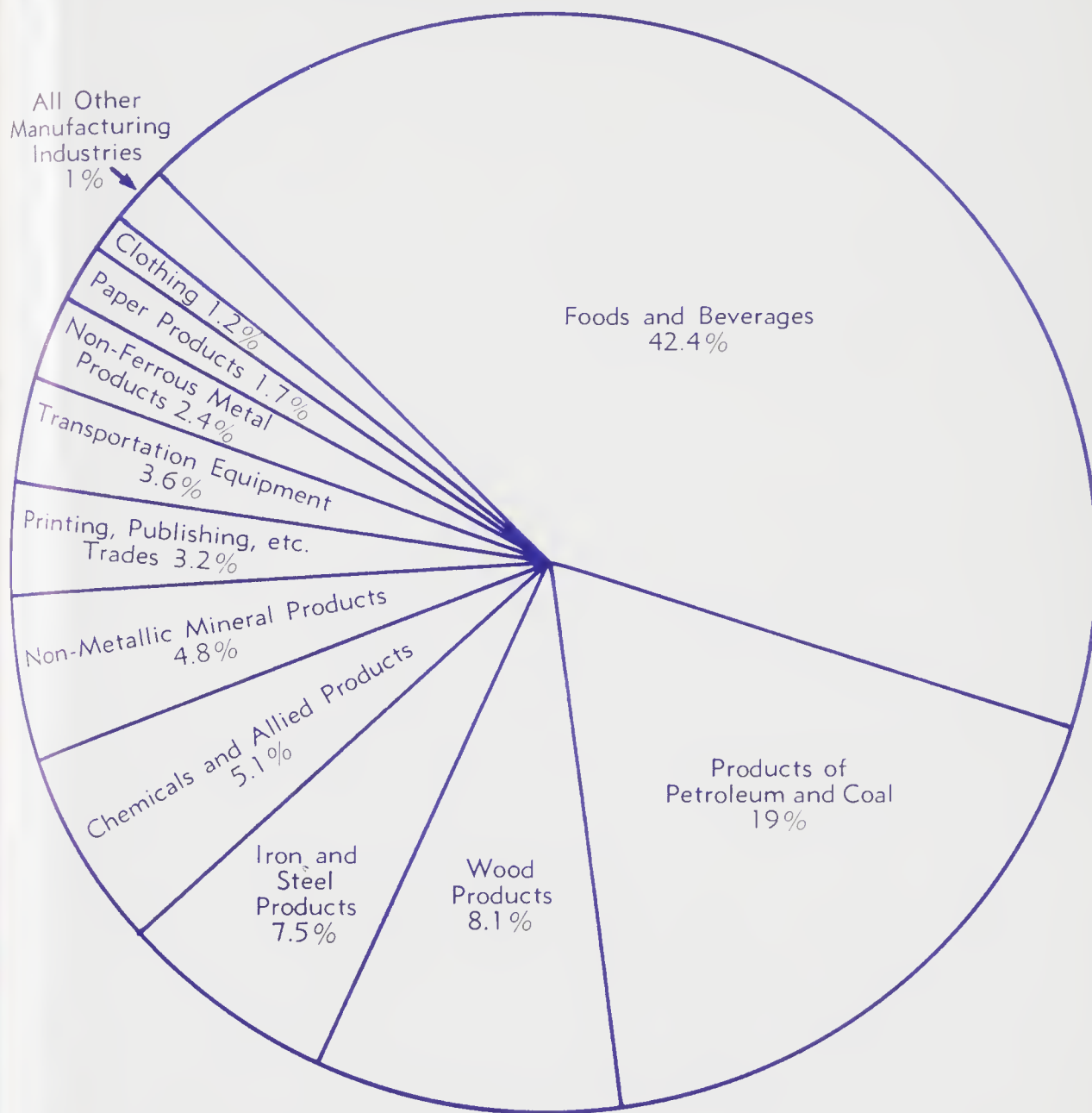
Foods and Beverages

This industry group is by far the most important in the province. However, output value between 1949 and 1956 rose by only 39 per cent (estimate for 1957 is \$309 million), giving the group a growth ranking of fourteenth out of sixteen industry groups. A growth rate well below the average of 72 per cent for all manufactures in the province. Compared to a production value of \$248 million in 1954,* imports of food products were approximately \$64 million and exports \$94 million.

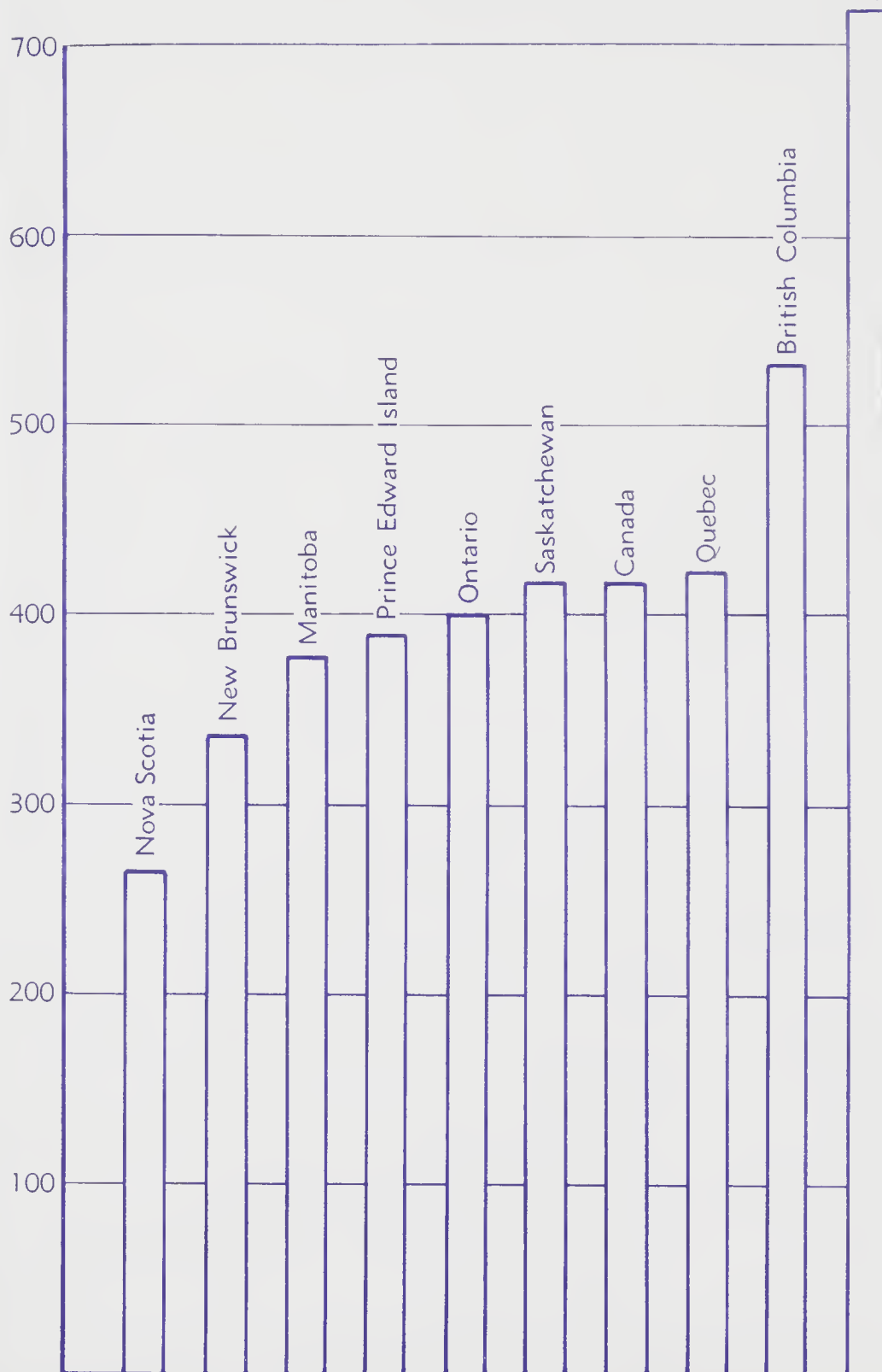
* 1954 is latest date when imports and exports were calculated.

MANUFACTURING INDUSTRY GROUPS IN ALBERTA

(Based on Selling Value in 1957)



**MANUFACTURING INDUSTRIES OF CANADA
VALUE ADDED BY MANUFACTURER
PERCENTAGE CHANGE 1939-1956**



LEADING MANUFACTURING INDUSTRIES IN ALBERTA GROSS VALUE OF PRODUCTION 1943-56

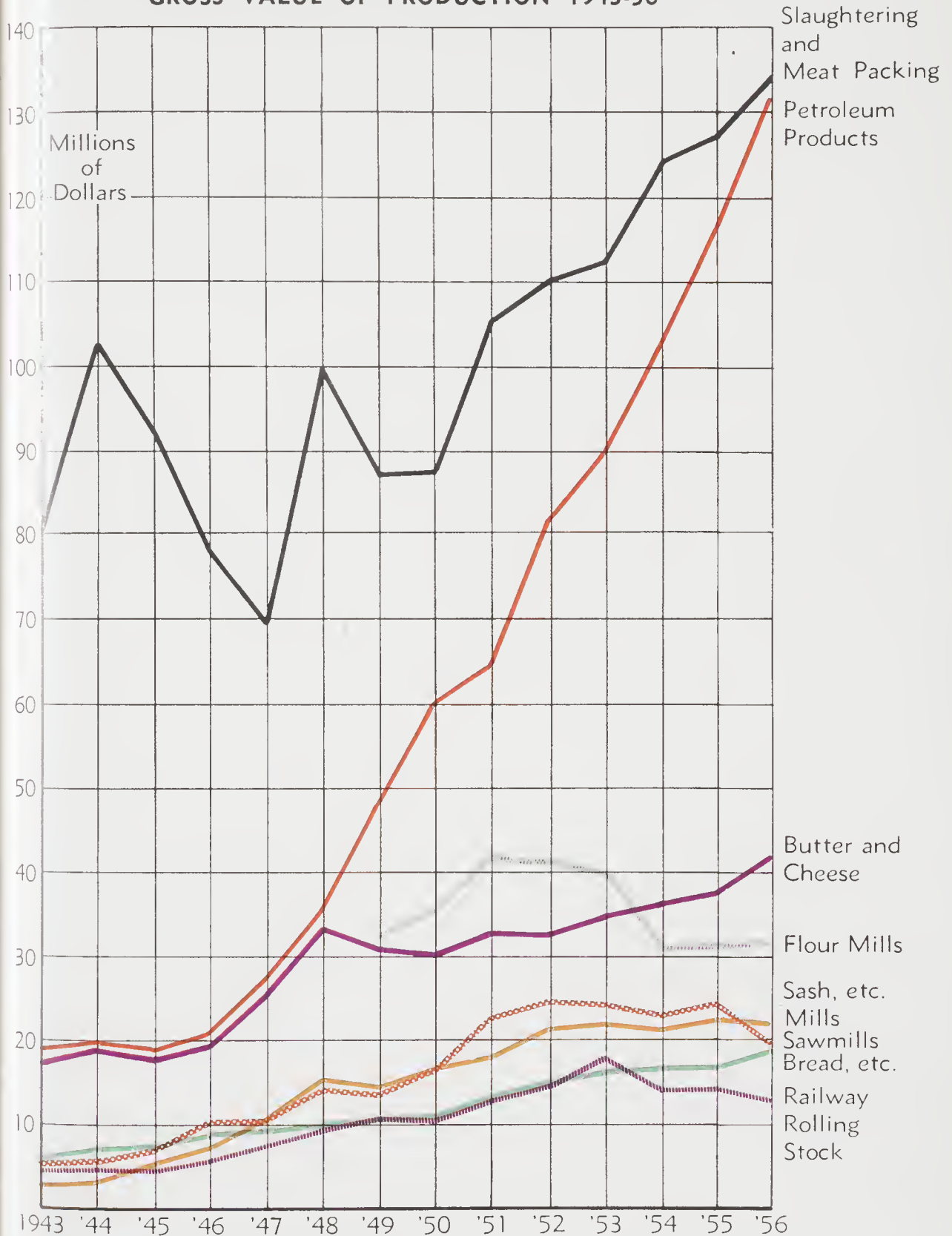


TABLE III

MANUFACTURING INDUSTRIES IN ALBERTA — VALUE OF PRODUCTION IN 1949, 1955 AND 1956

Industries								Number of Establishments (1955)	Value of 1949 (Thousands of Dollars)	Factory Shipments 1955 (Thousands of Dollars)	Shipments 1956* (Thousands of Dollars)
<i>Food and Beverages</i> -	-	-	-	-	-	-	-	419	212,814	272,808	294,132
Bakery products	-	-	-	-	-	-	-				
Biscuits	-	-	-	-	-	-	-	3	2,207	2,456	2,905
Bread and bakery products	-	-	-	-	-	-	-	140	10,970	16,668	18,091
Beverages -	-	-	-	-	-	-	-				
Breweries	-	-	-	-	-	-	-	6	11,511	13,893	15,450
Carbonated beverages	-	-	-	-	-	-	-	23	3,503	4,788	5,483
Canning and processing	-	-	-	-	-	-	-				
Fruit and vegetable preparations	-	-	-	-	-	-	-	6	3,240	4,385	4,490
Dairy products -	-	-	-	-	-	-	-				
Butter and cheese	-	-	-	-	-	-	-	100	30,736	36,893	41,989
Cheese - process	-	-	-	-	-	-	-	1	3,682	3,119	
Concentrated milk products	-	-	-	-	-	-	-	2			
Other dairy products	-	-	-	-	-	-	-	1			
Grain mill products	-	-	-	-	-	-	-				
Feeds, stock and poultry, prepared	-	-	-	-	-	-	-	46	7,845	7,740	8,592
Feed mills	-	-	-	-	-	-	-	36	2,359	446	657
Flour mills	-	-	-	-	-	-	-	11	32,331	30,954	31,955
Meat products	-	-	-	-	-	-	-				
Slaughtering and meat packing	-	-	-	-	-	-	-	15	86,551	126,628	133,689
Other food industries	-	-	-	-	-	-	-				
Confectionery	-	-	-	-	-	-	-	8	127	507	516
Animal oils and fats	-	-	-	-	-	-	-	1	14,853	15,983	17,595
Distilled liquors	-	-	-	-	-	-	-	1			
Foods, breakfast	-	-	-	-	-	-	-	2			
Macaroni and kindred products	-	-	-	-	-	-	-	1			
Sugar refining	-	-	-	-	-	-	-	3			
Miscellaneous food preparations	-	-	-	-	-	-	-	13	2,899	8,350	12,721
<i>Tobacco and Tobacco Products</i> -	-	-	-	-	-	-	-	(a)	(a)	(a)	(a)
<i>Rubber Products</i>	-	-	-	-	-	-	-	(b)	(b)	(b)	(b)
<i>Leather Products</i>	-	-	-	-	-	-	-	10	208	225	242
Leather tanning	-	-	-	-	-	-	-	3	13	24	26
Gloves and mittens	-	-	-	-	-	-	-	1	194	200	216
Footwear	-	-	-	-	-	-	-	—			
Miscellaneous leather goods	-	-	-	-	-	-	-	6			

TABLE III (Continued)

MANUFACTURING INDUSTRIES IN ALBERTA — VALUE OF PRODUCTION IN 1949, 1955 AND 1956

Industries	Number of Establishments (1955)	Value of Factory Shipments		
		1949 (Thousands of Dollars)	1955 (Thousands of Dollars)	1956* (Thousands of Dollars)
<i>Textiles</i> - - - - -	19	1,979	5,108	4,924
Awnings, tents and sails - - - - -	10	426	590	544
Embroideries, pleating, hemstitching, etc. - - - - -	3	1,552	64	65
Bags, cotton and jute - - - - -	2		4,454	4,255
Synthetic textiles and silk - - - - -	2			
Miscellaneous textiles - - - - -	2			
<i>Knitting Mills</i> - - - - -	4	366	260	244
Hosiery - - - - -	1	366	260	244
Knitted goods - - - - -	3			
<i>Clothing</i> - - - - -	24	5,773	7,663	8,355
Men's, women's and children's clothing				
Clothing, men's, factory - - - - -	9	4,799	6,852	7,500
Clothing, women's, factory - - - - -	6	504	406	366
Miscellaneous clothing				
Fur goods - - - - -	6	470	172	111
Hats and caps - - - - -	2		234	238
Oiled and waterproof clothing - - - - -	—			
Fur dressing and dyeing - - - - -	1			
<i>Wood Products</i> - - - - -	989	36,959	56,917	55,822
Furniture - - - - -	82	2,894	5,779	7,544
Saw and planing mills				
Sash, door and planing mills - - - - -	122	13,750	22,087	21,922
Sawmills - - - - -	761	13,501	23,853	20,063
Other wood industries				
Boxes and baskets - - - - -	4	1,324	1,155	1,327
Morticians' goods - - - - -	5	89	339	355
Excelsior - - - - -	1	5,402	3,704	4,561
Veneers and plywoods - - - - -	1			
Miscellaneous wood products - - - - -	13			
<i>Paper Products</i> - - - - -	13	1,919	10,268	12,163
Roofing paper - - - - -	3	(c)	3,869	4,344
Boxes and bags - - - - -	6	(c)	5,147	6,290
Miscellaneous paper goods - - - - -	3	(c)	1,251	1,519
Pulp and paper - - - - -	1	(a)		

TABLE III (Continued)

MANUFACTURING INDUSTRIES IN ALBERTA — VALUE OF PRODUCTION IN 1949, 1955 AND 1956

Industries							Number of Establishments (1955)	Value of 1949 (Thousands of Dollars)	Value of 1955 (Thousands of Dollars)	Shipments 1956* (Thousands of Dollars)
<i>Printing, Publishing, and Allied Industries</i> - - -										
							276	11,638	20,574	22,448
Commercial printing										
Printing and bookbinding - - -							81	3,158	6,036	6,279
Trade composition - - -							2			
Engraving, stereotyping and allied industries										
Engraving, stereotyping and electrotyping - -							6	206	370	412
Lithographing - - -							4	111	203	223
Printing and publishing										
Printing and publishing - - -							80	7,477	12,816	14,299
Publishing of periodicals - - -							103	686	1,149	1,235
<i>Iron and Steel Products</i> - - -										
							150	13,873	40,553	52,667
Agricultural implements - - -							10	1,383	1,493	1,630
Cuttings, iron - - -							11	1,912	3,535	4,569
Hardware, tools and cutlery - - -							4	12	352	255
Heating and cooking apparatus - - -							12	367	1,716	1,407
Machinery, industrial - - -							4	1,853	2,197	3,274
Machine shops - - -							68	2,971	5,875	8,050
Sheet metal products - - -							13	2,587	6,363	7,866
Miscellaneous iron and steel products - - -							10	2,788	4,578	7,483
Primary iron and steel - - -							3			
Wire and wire goods - - -							2			
Boilers, tanks and platework - - -							9			
Bridgebuilding and structural steel - - -							4		10,992	12,432
<i>Transportation Equipment</i> - - -										
							23	12,495	19,390	25,564(c)
Railway rolling stock - - -							3	10,626	13,551	
Motor vehicle parts - - -							17	808		
Aircraft and parts - - -							1	1,060	5,839	
Boat building - - -							2			
Carriages, wagons and sleighs - - -							—			
<i>Non-Ferrous Metal Products</i> - - -										
							12	902	15,164	17,425
Aluminum products - - -							4	(c)	138	154
Brass and copper products - - -							4	(c)	1,020	1,062
Jewellery and silverware - - -							2	(c)	14,006	16,209
Non-ferrous metal smelting and refining - -							1	(a)		
White metal alloys - - -							1	(a)		

TABLE III (Continued)

MANUFACTURING INDUSTRIES IN ALBERTA — VALUE OF PRODUCTION IN 1949, 1955 AND 1956

Industries	Number of Establishments (1955)	Value of 1949 (Thousands of Dollars)	Factory Shipments 1955 (Thousands of Dollars)	1956* (Thousands of Dollars)
<i>Electrical Apparatus and Supplies</i> - - - -	9	40	3,088	3,877
Batteries - - - - -	5	(c)	2,213	2,579
Machinery, heavy, electrical - - - - -	2	(c)	875	1,298
Miscellaneous electrical apparatus and supplies - -	1	(c)		
Radio and television sets and parts - - - - -	1	(c)		
<i>Non-Metallic Mineral Products</i> - - - - -	76	14,759	33,036	33,059
Clay products from domestic clay - - - - -	11	1,603	2,800	3,014
Concrete products - - - - -	39	2,395	13,191	14,515
Lime - - - - -	5	328	625	728
Stone products - - - - -	6	358	915	991
Other miscellaneous non-metallic mineral industries				
Cement hydraulic - - - - -	1	9,870	10,649	7,455
Clay products from imported clay - - - - -	2			
Gypsum products - - - - -	2			
Salt - - - - -	2			
Glass and glass products - - - - -	3		4,359	5,648
Miscellaneous non-metallic mineral products - -	5	205	496	723
<i>Products of Petroleum and Coal</i> - - - - -	21	48,210	116,233	132,380
Petroleum products - - - - -	18	(c)	115,990	131,980
Miscellaneous products of petroleum and coal - -	3	(c)	243	400
<i>Chemicals and Allied Products</i> - - - - -	31	9,319	36,865	35,250 (c)
Soaps, washing compounds and cleaning preparations	5	451	546	
Acids, alkalies and salts - - - - -	3	7,668	29,510	
Fertilizers - - - - -	1			
Medicinal and pharmaceutical preparations - -	2			
Paints, varnishes and lacquers - - - - -	1			
Primary plastics - - - - -	2			
Vegetable oils - - - - -	1			
Other chemical industries				
Gases, compressed - - - - -	6	981	1,356	
Miscellaneous chemical products - - - - -	10	218	5,452	

TABLE III (Continued)

MANUFACTURING INDUSTRIES IN ALBERTA — VALUE OF PRODUCTION IN 1949, 1955 AND 1956

Industries	Number of Establishments (1955)	Value of Factory Shipments		
		1949 (Thousands of Dollars)	1955 (Thousands of Dollars)	1956* (Thousands of Dollars)
Miscellaneous Industries - - - - -	47	743	2,997	3,230(c)
Scientific and professional equipment - - - - -	5	48	177	
Sign electric, neon and other - - - - -	28	454	2,417	
Other miscellaneous industries				
Artificial flowers and feathers - - - - -	1	241	321	
Brooms, brushes and mops - - - - -	1			
Ice, artificial - - - - -	2			
Models and patterns, excluding paper - - - - -	—			
Rubber goods, including footwear - - - - -	1			
Sporting goods - - - - -	—			
Stamps and stencils, rubber and metal - - - - -	2			
Saltatory, art goods, regalia and novelties - - - - -	2			
Toys and games - - - - -	1			
Plastics products - - - - -	4		82	
Total - - - - -	2,123	371,995	641,148	701,768

(a) No production.

(b) Included in "Miscellaneous Industries".

(c) No breakdown available.

* D.B.S. preliminary figures.

Notes: Industry production values may not add to total for industry groups due to rounding.

Slaughtering and Meat Packing is the leading food industry, producing almost half of the group's output in value terms. Its products and their factory selling values of \$127 million in 1955* were

Products	Millions of Dollars
Fresh and frozen meat - - -	80
Poultry meat - - -	2
Cured and smoked meat - - -	15
Sausage and cooked meat - - -	12
Canned meat - - -	8
Other products - - -	10
	—
Total - - -	127

This total represents about one-sixth of total Canadian output by this industry. Some \$50 million worth of products, a substantial proportion of the province's meat production, was exported to other provinces and overseas. The industry's growth rate on the basis of factory sales 1949-56 was 55 per cent. Plants are concentrated at Edmonton and Calgary; in 1955 Edmonton produced some \$87 million and Calgary \$39 million worth of meat products, with output in the rest of Alberta amounting to only \$1 million.

The second food industry, Dairy Products, contributed 36 per cent to Alberta's food production in 1956. In 1955 of \$40 million worth of products sold, \$9 million worth, was exported outside the province. Butter was the chief export item, accounting for \$7 million, with cheese and concentrated milk contributing \$1 million each. Dairy products are produced in numerous centres, but major plants employing in excess of 100 people are located at Calgary, Edmonton and Red Deer.

The output of Alberta flour mills decreased slightly between 1949 and 1956. This industry's difficulties are largely due to a decline in exports to countries which are developing their own milling industries. Of \$31 million worth of flour produced in 1955, \$16 million worth was exported to other provinces and countries.

Production of bread and bakery products and by breweries has grown in proportion to the local market.

Prepared feeds sales values decreased by one per cent between 1949 and 1955, but sales which fell through 1953 have been increasing in subsequent years. The spread of scientific stock feeding is likely to provide a growing market for feeds.

Vegetable canning is likely to improve on its past growth rate (1949-55: 35 per cent). Canneries are concentrated in the southern part of the province, where there will be further abundant supplies of vegetables when the projected extension of the St. Mary and Milk Rivers irrigation districts is completed. This industry is not limited by local markets; in 1954, 43 per cent of its output was exported.

Sugar is produced by one company at three plants in the Lethbridge area. Malt accounted probably for \$8 million including \$6 million worth of exports. A remaining \$4 million represents the production value of confectionery, animal oils and fats, distilled liquors, breakfast foods and macaroni type products.

It is forecast that the gross production value of the Foods and Beverages industries group will reach \$560 million in 1975, an increase of 10 per cent over the 1955 production gross of \$277 million. The expected annual rate of increase is 3.7 per cent. Although this rate is lower than that forecast for most other industry groups, the group should retain its position as the leading manufacturing group in Alberta.

Petroleum and Coal Products

Output of Petroleum Products in 1955** totalled \$116 million, and two types of plants contributed to this total in the following proportions:

Petroleum refineries - -	\$108 million
Absorption gasoline plants - \$	8 million

Petroleum refineries are located mainly in the area bounded by Edmonton, Calgary and Lloyd-

* The total factory selling price for 1956 according to D.B.S. preliminary figures is \$133,689,000.

** 1957 estimates of the Alberta Bureau of Statistics are \$135 million for petroleum and coal products.

mineral, with more than half of the province's total capacity concentrated at Edmonton. Three units operate outside this area at Grande Prairie, Wainwright and Hartel.

In 1955 some \$24 million of refinery products was exported. Imports into Alberta amounted to only \$3 million. The most important manufactures in descending order of sales values in 1956 were motor gasoline, diesel fuel, heavy fuel oils, aviation fuels, and light fuel oils.

Absorption gasoline plants include units where

gasoline and other products are scrubbed from "wet" gas, and units where hydrogen sulphide is removed from "sour" gas. "Wet" gas, by definition, contains an economically recoverable content of readily liquefiable hydrocarbons—chiefly propane and butane. The separation of these liquefied petroleum gases (LPG's) is necessary before piping the gas over long distances, as is the removal of hydrogen sulphide, which in the presence of moisture will corrode pipelines and combustion equipment. The principal products of these plants in 1955 and 1957* were these:

				Unit of Measure		Quantity		Selling Value at Works	
						1955	1957*	1955	1957
Natural Gasoline	-	-	-	Imp. Gals.		30,177,000	43,567,290	2,440,000	----
Propane	-	-	-	Imp. Gals.		22,932,000	38,897,417	1,114,000	----
Butane	-	-	-	Imp. Gals.		13,156,000	26,120,905	557,000	----
Sulphur	-	-	-	Long Tons		26,000	100,705	570,000	----
Total	-	-	-	-	-	-	-	4,681,000	----

Alberta sulphur production capacity is now about 100,000 long tons per year. Existing plants, after planned expansion has taken place, will have capacity of 320,000 tons per year, and four further plants have been planned at Calgary, Okotoks, Coleman, Innisfail and one in the Peace River district of British Columbia (Capacity 100,000 tons per year). Alberta sulphur has so far found an outlet in British Columbia pulp mills, a fertilizer plant at Medicine Hat, a sulphuric acid plant at Fort Saskatchewan, the acid plant of Gunnar Mines Limited in northern Saskatchewan, and in the pulp mill at Hinton. The Peace River scrubber will be orientated towards supplying 50,000 tons of sulphur to pulp mills in British Columbia and will seek to export to the United States and overseas the balance of 50,000 tons per annum of initial production.

It is possible that Alberta sulphur will be supplied to Eastern Canada in the near future. In 1956, Canada imported about 400,000 tons of sulphur, a quantity which Alberta should be able to supply by 1960. However, in order to be competitive in Eastern Canadian markets, sulphur pro-

ducers and railway companies will have to reduce present prices and freight rates respectively. If this does not occur, the sulphur will have to be sold on world markets through Vancouver. Here it would be faced with competition from United States and Mexican sulphur. Because it is a by-product made at low cost the net realization could be satisfactory.

Three plants in the Lloydminster area and two at Calgary manufacture a variety of asphalt coating, paving and caulking compounds. The total sales in 1955 of asphalt products amounted to \$272,000, or only a fraction of one per cent of the total value of factory shipments by this industry group.

Coal briquettes are manufactured at Canmore, Coleman and Blairmore. Value of production in 1955 is estimated at \$7 million, of which over \$1 million worth was exported outside the province. Between 1946 and 1955 its tonnage output increased by more than 130 per cent.

It is forecast that by 1975 sulphur production will amount to some \$40 million, natural gasoline and hydrocarbon production to \$20 million, re-

* Alberta Bureau of Statistics estimates.

finery production to \$300 million including \$35 million worth of liquefied petroleum gases, and coal products production to \$10 million. The total of \$370 million would place the industry group second in production value only to Foods and Beverages. The average annual growth rate implied by the forecast is six per cent.

Wood Products

Alberta's third largest manufacturing industry group in 1955—(the fourth in 1957)—Wood Products, accounted for nine per cent of manufacturing production in the province of 1955. Of \$57^o million worth of products shipped, more than four-fifths was output of sawmills and planing mills.

The bulk of 1955 sawmill production consisted of sawn "rough" lumber, more than ninety per cent of which was spruce. Some sixty per cent of this output was used in Alberta, while about thirty per cent was shipped to the United States. The latter market, however, has been of widely varying importance in recent years, sometimes taking as little as seven per cent of Alberta production.

Apart from rough lumber, sawmills produced over \$1 million worth of sawn ties, and some \$1 million worth of miscellaneous products such as piling, poles, and posts.

There are some 1,200 sawmills in the province, ranging from plants employing less than six persons to establishments providing work for fifty to one-hundred men. Sawmills are in general located near the site of logging operations.

Some \$5 million worth of wood is planed in sawmills. However, dressed lumber is processed mainly in specialized establishments belonging to the Sash, Door and Planing Mills industry, which also manufactures sashes, doors, mouldings, box shooks, boxes, and wooden furniture. These mills produced some \$22 million worth of products in 1955.

Both gross production values and imports of furniture doubled between 1949 and 1955. The 1955 output of 82 plants in the province totalled \$6 million, while imports of furniture were estimated at \$12 million. The furniture industry, which is concentrated chiefly at Edmonton and Calgary,

produces most types of domestic, store, hotel and restaurant, garden and school furniture.

The principal remaining industry of the Wood Products group is Plywood and Veneer. In 1955 there was one plywood producer, at Grande Prairie. Since then two major plants have come into production at Edmonton, the largest of which has an initial capacity of 12 million square feet per year of hot-pressed, resin-bonded plywood. A fourth plant is expected to be constructed at Fort Fitzgerald on the Slave River, just south of the Alberta-Northwest Territories border.

Poplar is the wood mainly used in plywood and chipboard manufacture in Alberta. Spruce, available in the province, is another wood suitable for the manufacture of plywood and veneer. Bonding adhesives are manufactured by two chemical plants in the Edmonton area.

Among miscellaneous wood products, boxes and baskets are the main item. Their production value decreased by 13 per cent between 1949 and 1955, but as the products are also made by sash mills, there may not have been an actual decline in their total output.

It is forecast that the gross production value of Wood Products in 1975 will be \$100 million, compared to \$56 million in 1957. This represents an annual average increase of some three per cent.

Iron and Steel Products

Alberta's fourth largest manufacturing industry group in 1955—(third in 1957)—Iron and Steel Products, nearly tripled in gross production value between 1949 and 1955. The increase represents a rapid advance from a comparatively low base-period figure.

In 1955^{oo} the production of Iron and Steel Products in Alberta amounted to \$41 million, while imports were estimated at \$135 million. Production value in 1956 was about \$53 million, with imports totalling \$150 million. While the proportion of imports to domestic production has been declining, the province is likely to remain a substantial importer of these products since many types of heavy machinery and industrial equipment will probably

^o 1957 estimates from the Alberta Bureau of Statistics is \$56 million for wood products.

^{oo} 1957 estimates from the Alberta Bureau of Statistics is \$63 million for iron and steel products.

not be manufactured locally in the near future.

Bridgebuilding and Structural Steel in 1956 contributed \$12.5 million, roughly one-fourth, to the industry group's aggregate output value. There were five firms in this industry in 1956, located at Calgary, Edmonton, and Lethbridge, employing a total of some 800 persons. Their production consisted of cutting, welding, riveting, etc., and of erecting steel structures for buildings, bridges and other construction work. Fabricators of steel for other uses are included in the Miscellaneous Iron and Steel Products industry.

The output of the Sheet Metal Products industry was \$8 million, or one-sixth of the aggregate production value of the group in 1956. This industry comprises 13 establishments at Edmonton and Calgary which manufacture culvert piping, fencing, smoke stacks, eavestroughs, garbage cans, metal windows and doors, and other similar products. In 1955 an estimated \$3 million worth of products was imported. These included certain items not now made in Alberta, such as bottle caps, enameled kitchenware, steel drums, cans, pails and was tubs.

In 1956, gross production value of 68 establishments in the Machine Shops industry totalled \$8 million. Employees averaged eleven per establishment.

The Iron Castings industry in 1956 produced \$4.5 million worth of products, including pipe, pipe fittings and valves, and machinery and parts made as secondary products. The 12 firms in the industry were located at Calgary, Edmonton, Lethbridge, Medicine Hat, St. Paul and Grand Prairie. Raw material supplies consisted mainly of pig iron, brass and bronze, imported from British Columbia and elsewhere, and of cast iron scrap. Uses of products include gas pipeline construction, water installations, farm and construction machinery and gas burners.

The outstanding developments in the industry have been the coming into production in 1956 of Alberta's first pipe mill, and the completion of a second pipe mill in the summer of 1957. The first pipe mill, situated at Edmonton, has a capacity of 150,000 tons per year and represents an investment of some \$6.5 million. Its market is in all parts of

Western Canada and includes medium-sized natural gas pipeline installations. Steel skelp used is imported from Eastern Canada and the United States. The second pipe mill, which manufactures cast iron pressure water pipe, was built at Ogden, Calgary, at a reported investment of \$2 million. Raw materials will be locally obtainable scrap iron as well as imported pig iron and coke.

These new plants will tend to give the industry a higher growth rate than in the recent past, when its growth was approximately the same as the average growth rate for all manufacturing industries.

There are nine firms in the Boilers, Tanks and Platework industry. Located at Edmonton, Calgary, Lethbridge and Lloydminster, they are engaged mainly in the manufacture and repair of steel tanks, including truck tanks. There should be an opportunity for heat exchanger manufacture in Alberta.

Production has shown a considerable increase in recent years. In 1949 Alberta is estimated to have produced less than \$200,000 worth of boilers, etc., while by 1956 the output value reached \$5.7 million. The latter figure represents an advance of some \$2.8 million over 1954 sales. Imports, which amounted to \$5 million in 1954, are still substantial.

The Industrial Machinery industry, with an output value of \$2 million in 1955, and \$3 million in 1956 had a growth rate of only 19 per cent during the five preceding years. Imports amounted to some \$50 million in 1955 and came mostly from the United States.

A great portion of the imports was heavy machinery. These products, tending to be standardized, are manufactured (in many cases under patent or licence) near or at established industrial centres in the United States and in Eastern Canada. It is unlikely that Alberta will become an important producer of heavy machinery in the near future. On the other hand, light industrial machinery such as lifting equipment and sawmill equipment are manufactured in the province and this field offers scope for expansion. The 1955 output of \$2 million came from four firms located at Edmonton and Calgary.

The gross production of the Heating and Cooking Apparatus industry in 1956 was \$1.4 million, by

12 firms located at Edmonton, Calgary, Lethbridge and Medicine Hat. The average number of employees per establishment was 12; three firms employed between 26 and 50 persons. Products included domestic warm air furnaces, stove parts, mechanical stokers, and gas and propane burners. Power boiler, air conditioning apparatus, radiators, stoves and ranges, and water heaters are not at present made in Alberta; for supplies of these and other products the province at present relies on imports. Prospects for future increases in output of this industry are considered good.

Alberta's production of agricultural implements is relatively low. In 1956 only \$1.6 million worth of agricultural machinery was produced, while imports in 1954 amounted to over \$32 million. In addition to the ten firms whose output made up the production figure given, the Alberta Bureau of Statistics lists a further 15 establishments which made agricultural implements or parts for them.

Taking into account this additional production of farm machinery does not alter the overall picture. One reason commonly given for the retardation of the industry is the absence of duty on farm machinery. However, free trade conversely can benefit Alberta manufacturers, enabling them to enter the United States market. The scope offered to producers in this field is illustrated by the case of a company manufacturing specialized sub-tillage plows and seed drills near Lethbridge. This firm developed a range of implements, some of which have been patented, for trash-cover farming, permitting the conservation of moisture and reduction of soil drifting in dry and windy areas. Sixty-five per cent of the firm's output is now exported to Montana and other parts of the United States and to Central and South America.

Primary Iron and Steel is the most important of the remaining industries in the Iron and Steel Products group. Of the three producers listed in 1956 statistics, two are located at Calgary, their furnaces have a total annual capacity of 4,900 tons of steel and steel alloy which go into castings. In November, 1955, a \$2 million steel rolling mill went into production on the southern outskirts of Edmonton. Its furnace, which has a capacity of 90,000 tons per year, works on scrap metal. Products include small or light structurals up to about ten pounds per foot, four-inch channels, bar-size angles, six-inch wide flats, rounds, squares, and beams.

The erection of a second steel mill, working on local iron ore and coal deposits, is at present under consideration. The plant would manufacture raw steel skelp and structurals. The construction of one or two additional smelters in the province by 1975 appears likely.

An annual average growth rate of 8.3 per cent is predicted for this industry group between 1955 and 1975. An output of \$200 million (constant 1955 dollars) would give the industry group fourth ranking among manufacturing industry groups in 1975. The forecast expansion rate is based mainly on the expectation that secondary steel production in the province will grow at this rate; the forecast may be exceeded if Alberta should become a major primary steel producer. Should the present policy of free entry of oil field equipment be modified there should be an opportunity for the manufacture of a considerable volume and variety of items. In 1956 some \$60 million worth was imported. Only a few items are presently manufactured in the province.

Chemicals and Allied Products

The Chemicals and Allied Products industry group, largely based on raw materials readily available from oil and gas production, has shown the greatest growth rate of any major industry group in Alberta in recent years. Output value increased by nearly five times from 1949 to 1957; in the latter year, gross production totalled nearly \$43 million. Before World War II the group contributed less than one per cent to the province's total value of manufacturing output, but this proportion had increased to six per cent in 1957.

The basic chemical industry was founded in the province in 1941, when a plant was built at Calgary to produce ammonia and ammonium nitrate, using natural gas as the principal raw material. Before the end of the Second World War this plant was converted to the manufacture of ammonia and fertilizer-grade ammonium nitrate. In 1952, an industrial high explosives plant commenced operation at Calgary, using ammonia and ammonium nitrate from the fertilizer plant. From 1953 through 1956, eight new chemical plants and numerous expansions were completed, with new investment totalling some \$150 million.

Of three establishments in the Acids, Alkalies

and Salts industry, two are petrochemical plants. One of these is Alberta's largest chemical plant to date. Located at Edmonton, it went on stream in 1955 producing oxygenated petrochemicals, cellulose acetate, and acetate yarn. Feed stock to the petrochemical area is liquefied propane and butane, fractionated from wet natural gas and from the off-gases of Edmonton oil refineries. The main petrochemical end-product is pentaerythritol (approximately 8,500 tons per year), the bulk of which is sold in world markets, including the United States. Other products include acetaldehyde, acetic acid, formaldehyde, methanol, acetone, propylene glycol and n-propanol. Acetic acid finds an outlet in the company's cellulose acetate flake area, and formaldehyde is sold to makers of plywood glues in Alberta and on the West Coast.

A second plant manufactures sulphuric acid at Fort Saskatchewan, using sulphur obtained from sour natural gas. Its major customer is the chemical-metallurgical plant at Fort Saskatchewan, smaller quantities of sulphuric acid being sold for use in storage batteries and in clay treatment.

The third plant in this industry, located at Duvre, manufactures caustic soda, chlorine and muriatic acid by electrolysis, using salt from local beds, water from the North Saskatchewan River, and power generated from natural gas. Chlorine is sold to pulp mills and for water purification, caustic soda to pulp mills, other chemical plants and for ore treatment. Muriatic acid for ore treatment and for oilwell acidizing.

An analysis of the raw products used in the Acids, Alkalies and Salts industry shows that all plants used natural gas as fuel and/or feed stock. All other major raw materials are obtained locally from natural resources or local production. Markets for the higher-priced products are worldwide, as exemplified by pentaerythritol which, due to cheaper raw material sources and economies of large scale integrated operation, is able to absorb a two and one-half cents per pound freight charge when shipped to Eastern Canada. Markets for lower-priced products are in Western Canada, including the Northwest Territories.

The fertilizer plant at Calgary, which had its origin in a wartime demand for ammonia and ammonium nitrate, pioneered the manufacture of ammonia from natural gas. The plant produces over 110,000 tons of anhydrous ammonia per year, most

of which is shipped by tank car to British Columbia for captive consumption in ammonium sulphate and ammonium phosphate production. The ammonia is also used at the Calgary plant to manufacture nitric acid and ammonium nitrate prills.

A second fertilizer plant began operating in 1956 at Medicine Hat. Constructed at a cost of between \$20 and \$23 million, it has an annual capacity of 35,000 tons of ammonia, 35,000 tons of ammonium nitrate fertilizer, and 100,000 tons of ammonium sulphates-phosphates. Raw materials are natural gas, sulphur from natural gas, and phosphate rock, imported from Montana. Water for processing and cooling requirements is pumped from the South Saskatchewan River.

A third fertilizer plant is the chemical-metallurgical plant at Fort Saskatchewan, which went into production in 1954. Of 95 tons of ammonia produced daily (in 1957), approximately 20 tons are in excess of the metal plant requirements and are sold as nitrogen fertilizer. Sulphur from the nickel ore and ammonia used in the process are recovered as ammonia sulphate, and approximately 80,000 tons of this nitrogen fertilizer is produced annually.

Markets for fertilizer made in Alberta are largely confined to Western Canada and the United States. Varying quantities are shipped overseas, notably to the Pacific area each year.

The first two establishments in the Primary Plastics industry is the cellulose acetate section of the major petrochemical plant at Edmonton. The starting products in its operation are cellulose from British Columbia pulping operations and acetic acid, and acetic anhydride from the chemical section of the plant. The cellulose acetate, after solution in acetone, is converted to acetate flake and to staple fibre and filament yarn.

The second plastics plant, also located at Edmonton, manufactures some 16 million pounds of polyethylene per year; its designed capacity of 25 million pounds per year provides for future increases in output. The plant uses natural gas from the Leduc-Woodbend field both for its ethane component, the chief raw material, and as fuel. The market for polyethylene is mainly in Eastern Canada; with this relatively high-priced product, the advantages of low-cost raw material and cheap fuel outweigh the freight disadvantages. A smaller market is also being built up in Alberta where

polyethylene is used in the fabrication of plastic pipe.

Linseed oil is produced in Medicine Hat and an edible oil plant is proposed for Lethbridge.

Two further primary plastics plants went into production in 1956, in the Edmonton area. These establishments manufacture phenolic, urea and urea-formaldehyde resins for use in the new and thriving Alberta resin-bonded plywood industry. Of the raw materials used, so far only formaldehyde is manufactured in Alberta, at Edmonton.

In the compressed Gases industry, a 1955 gross output value of \$1.4 million was produced by three establishments at Edmonton, one at Calgary and one at Lethbridge. Altogether 110 people were engaged in the manufacture of oxygen, acetylene, carbon dioxide and nitrogen, sold mainly in cylinders.

Ten establishments operated in the Miscellaneous Chemical Products industry in 1957. Plants in this classification are manufacturers of explosives and compounders of agricultural chemicals, sweeping compounds, polishes, cleansing preparations, dressings, etc. The one major plant classified in the industry is an explosives plant at Ogden, Calgary, which commenced production in 1952 and represents an investment of \$4 million. The plant is advantageously located because of the local availability not only of ammonia, but also of cheap fuel gas, water and electric power, and because of its proximity to users in the oil industry in Alberta, Saskatchewan and British Columbia. It supplies explosives for exploratory and mining operations in Alberta, Saskatchewan, the Yukon and the Northwest Territories.

The future of the chemical industry in Alberta is sure to be bright, but difficult to predict. No useful prediction of chemical production in 1975 can be derived by projecting trends of past growth, since the industry in Alberta is of too recent origin. These figures show the annual percentage in gross output of the industry, adjusted to constant dollars:

	Per cent Increase
1950-51	7
1951-52	14
1952-53	40
1953-54	73
1954-55	42
1955-56	8
1956-57	15 (Estimated)

The chemical products of Alberta can be divided into three broad groups, which can be expected to grow at different rates because of several factors. The most important of these are the low cost of natural gas and petroleum hydrocarbons, and the high cost of moving chemical products from Alberta to major markets and to Alberta from other producing areas. It is reasonable to assume that these factors will not change radically during the forecast period.

The most important product group, in terms of both capital investment and value of output, presently includes pentaerythritol, polyethylene and cellulose acetate. These are relatively high cost materials, so that availability of low-cost fuel and raw material resources helps to outweigh the influence of transportation costs. It is possible for this type of product to be manufactured in a few plants located close to energy or material resources, and to be shipped to nation-wide or even world-wide markets.

Technical progress will be a major controlling factor in the growth of this group of products. The processes currently used were unknown to us twenty years ago, and were developed under the influence of the economic incentives provided by the discovery and development of gas, petroleum, and other resources.

Although most of the important petrochemicals are produced in Canada, only a few of the high-cost petrochemicals, such as polyethylene and pentaerythritol, are produced in Alberta for export. As the cost of hydrocarbons in other areas is reduced by pipeline movement of oil and gas, the economic factors which have caused this situation will continue, and probably increase. As a result of pipeline operations, however relatively cheap propane and butane will become very abundant in Alberta, thereby improving the economics of products based on these raw materials, such as polypropylene and butadiene.

Production of acetate rayon, nickel and cobalt illustrates the directing effect of other resources. High-quality cellulose for acetate fibre is obtained from pulp mills in British Columbia, and acetic anhydride is produced from propane and butane. Nickel and copper are refined from ore concentrates produced in Manitoba. In both cases, availability of petroleum raw materials strongly influenced the Alberta site selection.

Chemical products based on similar combination of resources will continue to dominate the growth of the industry in Alberta. Individual developments may occur at the rate of one major product every two to four years, but in most cases will require large investment and have high total output. As the mineral resources of the surrounding area are developed, copper, zinc, and uranium may be produced. Important new chemical products may be expected to appear through modification of cellulose and other forest products. Agricultural products represent another resource which can be processed chemically into more useful and valuable foods or other products, such as hydrogenated vegetable oils, synthetic fibres, and plastics. Many potential developments in these fields are only in the preliminary stages or completely in the future, but it seems probable that the growth rate will accelerate during the entire forecast period, and for a considerable period thereafter.

Low-cost (inorganic) chemicals constitute a second distinct group of Alberta's chemical production. Of the major products in this category, only soda ash is not produced in Alberta, although salt and limestone, the usual raw materials, are both available. Phosphate rock is the only raw material not presently obtained from native resources. Diversification will not therefore be a major factor in the future growth of this segment of the industry.

Heavy chemical markets are geographically limited by the economic balance between production and transportation costs. Alberta markets are further restricted by tariffs which exclude most products from the United States. Certain Alberta products, however, can be produced at such low cost that they are able to compete in unusually large market areas. Sulphur and methanol are typical of these; the former is a by-product of natural gas processing, the latter of acetaldehyde production.

In most cases, the market area for Alberta production of heavy chemicals will include the Prairie Provinces and the Northwest Territories, though the market area for low-cost by-products and co-products will be larger and more flexible. Since almost every type of industrial activity requires heavy chemicals, the growth rate of heavy chemical production should correspond approximately with that of total industrial growth in the Alberta market

area. Some growth of this area will occur as production in the area increases and unit production costs decrease, but this growth will be slowed whenever competing producers locate plants to serve major new markets in fringe areas.

A third group of chemical and related products comprises those products not included in either of the above categories. These constitute a great variety of consumer, industrial, and agricultural products, such as paint, explosives, resins for bonding plywood, insecticides, wood-treating materials, etc. Most of these products are sold in regional markets similar to those of heavy chemicals. Frequently they are in competition with producers located in other areas, who are able to absorb transportation costs because of low production costs, due to large volume or other causes. The raw materials for these products are usually at an intermediate stage of manufacture, and may be available locally, or imported. Comparatively little additional processing is necessary to convert the raw materials to the desired products.

Local production may be expected whenever a suitable margin develops between production costs and the established value of the product in the market area. Since production costs are closely related to volume, this will not take place until the demand in the market area exceeds the volume required for economic production. The size and the growth rate of these markets depend considerably on the type of product. Consumer goods are related to population and standard of living, industrial chemicals to industrial production and sometimes growth, agricultural chemicals to agricultural productivity, crop types, insect population, rainfall, etc.

During the early stages of economic development of an area, these operations may be scarcely significant. Later, this growth passes through a period of rapid acceleration as the number of products reaching the demand level necessary for economic local production increases, and because the first production of a product is usually a good deal greater than subsequent increases. In Alberta, this period of rapid growth may occur toward the end of the forecast period, by which time the demand for many products of this kind should have passed the necessary minimum. During the forecast period, the rate will probably be greater than that of population growth, but not as great as that of industrial growth.

Taking general account of the growth factors discussed above, it is predicted that the average annual growth rate during the forecast period will be about 8.1 per cent, and that the value of the gross output of Chemicals and Allied Products in 1975 will be about \$210 million. The corresponding growth rates of population and of all industry in Alberta are 3.6 per cent and 6.4 per cent per annum respectively. According to this forecast, chemicals will contribute ten per cent of the value of all manufacturing in Alberta in 1975, compared to six per cent in 1955, and to five per cent for the whole of Canada in 1955.

Non-Metallic Mineral Products

Between 1949 and 1955, this manufacturing group more than doubled its gross production value. Of \$33 million worth of products shipped in 1955,* about \$6 million worth was shipped outside the province. Imports of these products amounted to some \$4 million.

Concrete Products are made by 39 establishments, located in all parts of the province. In 1955 they accounted for 42 per cent of the gross production value of this group of industries, with a sales value of \$14.5 million. Major products of the industry were ready-mixed concrete, and concrete pipe and tile, while the most important raw material used was Portland cement.

Production by the Cement industry in 1955 made up about one-quarter of the total output of this group. In 1956, production was expanded as a new plant with an annual capacity of 800,000 barrels came into production at Edmonton. Additionally, the operations of the former single plant at Exshaw were expanded by the erection of a grinding plant at Edmonton. An appreciable percentage of the cement produced in Alberta is exported, mainly to Saskatchewan and the United States.

Glass manufacturing is the most important exporting industry of this manufacturing group. In 1956, production was valued at \$5.6 million and exports in 1954 at an estimated \$3.6 million. The bulk of this production came from the only major primary glass plant west of Ontario—at Redcliff, near Medicine Hat. The plant produces bottles, sealers, jars, and tumblers, and employs more than 200 persons.

A factory at Medicine Hat makes ornamental glassware. Since 1955, a glass fibre plant has been in production at Fort Saskatchewan, making a product mainly used in wrapping pipelines. Building insulation materials may be produced if the plant is expanded.

The Alberta Clay Products industry is comprised of ten plants. Eight firms use domestic clays (including shale) to make such products as building bricks, structural tile, roofing tile, drain tile, and sewer pipe. Two other firms produce stoneware and pottery. The majority of these establishments operate in the Medicine Hat area where both clay and natural gas for firing the tiles are abundant. Another firm included in the industry produces raw lump bentonite at Drumheller. A grinding plant is planned for Onoway, northwest of Edmonton.

The Clay Products industry increased in sales value by 87 per cent between 1949 and 1956. With good supplies of raw materials, low cost fuel and a rapidly expanding market in construction within the province, the industry has good prospects.

Two firms using imported clays operate at Medicine Hat, importing china clay from Illinois and minor quantities of ball clay from Saskatchewan. Art pottery, tableware, and electric porcelain are among the products made.

Gypsum Products are made in two plants at Calgary; products include plaster and wallboard. Raw material supplies come from captive quarries located in British Columbia and in Manitoba.

Stone Products are made by six firms. Output in 1955 was valued at \$992,000, a 177 per cent advance over the 1949 value. Products were mainly building stones, markers and monumental masonry. Stone from Kananaskis, and imported granite and marble are used as raw materials. Alberta imported \$1.5 million worth of stone products in 1954.

Salt is marketed by one producer at Lindbergh, 200 miles northeast of Edmonton. The salt is pumped as brine from local beds and purified for industrial and table use. The caustic soda-chlorine plant at Duvernay produces salt for captive consumption.

* 1957 estimate from the Alberta Bureau of Statistics is \$33 million for non-metallic mineral products.

lime Products are produced by two establishments at Kananaskis and Crowsnest. The sugar refineries in the Lethbridge area also treat limestone for captive consumption.

Other Non-Metallic Mineral Products include drilling mud additives, insulation materials, stucco, plaster and concrete aggregates. Drilling mud additives are made of bentonite by one establishment at Calgary, using Drumheller material. The plant dries, grinds, bags and ships the material to consumers in Western Canada for use as a drilling aid and as a carrier for weed killers, as a foundry sand binder, and as a sealer for irrigation ditches. Also used as a drilling mud additive is barytes mined in British Columbia, which is ground at Lethbridge.

Four lightweight aggregate plants, located at Calgary, manufacture expanded shale, perlite, and vermiculite. Expanded shale is sold mainly for use in concrete blocks, while perlite and vermiculite are used in plaster, concrete roofing, concrete flooring and as insulation. The raw material for expanded shale is quarried in the foothills 25 miles southwest of Calgary. Vermiculite is made from material imported from Montana, and perlite from the raw product originating in Southwest United States.

The 1975 gross production of Non-Metallic Mineral Products is forecast at \$125 million, compared to 1956 output of \$33 million. The forecast growth rate averages 6.9 per cent per year—a high rate for an industry group already firmly established in the province. Major considerations in arriving at this forecast were that the industry group works mainly with raw products present in Alberta, and that to an industry in which fuel is a relatively high proportion of costs, the benefits from available low cost gas are substantial.

Printing and Publishing Industries

With a gross production value of \$22.4 million, the Printing, Publishing and Allied Industries contributed 3.2 per cent to Alberta's total manufacturing output value in 1956.* The industry group's 1949-56 growth rate, measured by selling values, was 98 per cent.

That part of the industry which is engaged in manufacturing comprises 173 establishments with an average of 13 employees each. A further 103 establishments, each employing an average of less than two persons, publish periodicals but do not print their publications.

Three-fifths of the group's 1955 output value was derived from Printing and Publishing. The 80 establishments in this branch of the printing trade are publishers who operate their own printing presses. They range in size from plants publishing the leading newspapers of Edmonton and Calgary, each employing over 200 persons, to one-man enterprises engaged in writing, editing and printing "local" newspapers in small municipalities. A number of these firms also undertake commercial printing.

There are 81 firms in the Commercial Printing industry, about 40 located at Calgary and 30 at Edmonton. The industry also includes two firms at Calgary which do typesetting for printers. Ten firms at Edmonton and Calgary are engaged in engraving photo-engraving, and lithographing.

It is estimated that the gross output value of the printing trades will rise from \$22 million in 1956 to \$65 million in 1975. This is equivalent to an annual growth rate of 5.8 per cent, which approximates the predicted growth rate of the value of production in the province.

Transportation Equipment

The Transportation Equipment group, with a 1956** output value of \$25.5 million, contributed three per cent to the value of all manufacturing production in the province. The growth rate of this industrial group between 1949 and 1956 was 104 per cent.

The most important segment of the group, the Railway Rolling Stock industry, grew by 28 per cent between 1949 and 1955. Its output comes from two Canadian National Railways repair shops at Edmonton, and the Ogden and Calgary repair shops of the Canadian Pacific Railway. Work done consists of maintenance and repairs of diesel and steam locomotives, and freight and passenger cars

* 1957 estimates from the Alberta Bureau of Statistics is \$24 million for the printing and publishing industries.

** 1957 estimates from the Alberta Bureau of Statistics is \$27 million for transportation equipment.

of these two railway companies and of the Northern Alberta Railways.

The Aircraft and Parts industry has had an output value growth rate of some 20 per cent annually since 1949. There is one producer in this industry, located at the Edmonton Municipal Airport and manufacturing aircraft parts. The firm has more than 500 employees and performs mechanical work on aircraft.

Air traffic in Alberta is increasing rapidly and the establishment of other firms in the Aircraft and Parts industry is not unlikely.

The Motor Vehicle Parts industry increased its output value by 113 per cent over the period 1949-55. The 17 firms in the industry employ an average of 14 persons each, and their products include truck bodies, springs, trailers, hoists, boxes and fittings.

Between 1949 and 1954 this group of industries increased its output value at a slightly higher rate than manufacturing industries as a whole, but production dropped from 1954 to 1955. It is expected that the expansion of this group will parallel that of all manufacturing industries, at an average annual growth rate of 5.9 per cent through 1975. The predicted 1975 production value is \$75 million, compared to \$25.5 million in 1956. The increase in rate of output of the railroad workshops will tend to be less than that of the other industries in the group, and it is expected that the relative importance of the included industries will change as follows:

	1955 (Per cent of total group output)	1975
Railway Rolling Stock - - -	70	50
Aircraft and Parts - - -	21	30
Motor Vehicle Parts - - -	9	15
Other - - - - -	—	5

Pulp and Paper Products

The older branch of this industry group, in Alberta, is Paper Products. More than one-half of all paper production is classified as Boxes and Bags. This industry comprises six establishments at Calgary and Edmonton which produce paperboard

food containers, folding and corrugated paper boxes, and bags made from paper, cellophane and polyethylene. Food containers are exported to the other Prairie Provinces and to British Columbia. A second industry, Roofing Paper, comprises three establishments, at Edmonton, Calgary and Lloydminster, whose principal products are tar-coated building papers. The firms classified in the Miscellaneous Paper Goods industry are two envelope manufacturers at Edmonton and one straw insulation board plant at Innisfail, near Red Deer. The latter establishment uses wheat and barley straw as raw material in the manufacture of board for roof decking, walls, floors, ceilings, partitions, insulation and soundproofing. A soft board plant is under construction at Wabamun west of Edmonton.

Only one pulp and paper mill, a building paper and paperboard manufacturer at Edmonton, producing defibrated pulp, was listed in the 1955 statistics. With between 100 and 200 employees the mill was then the largest single unit in the industry group. Early in 1957 a major pulp mill came into operation at Hinton. Some 500 people are employed here, with about 1,500 men employed in woods operations. Constructed at an investment of between \$35 and \$50 million, the mill has a capacity of 150,000 tons of bleached sulphate pulp per year. The erection of a second major pulp mill is likely in the near future.

Pulp and Paper Products are expected to become Alberta's sixth largest manufacturing industry by 1975, producing six per cent of the province's manufacturing output by that year. The output of paper products is forecast at \$20 million, and that of pulp at \$100 million; the latter sum is equivalent to five times the initial capacity of the Hinton mill.

Clothing

The Clothing industry produced goods valued at 1.2 per cent of Alberta's total manufacturing production in 1956. This ratio has varied little during the past 15 years, and the industry's volume of output has risen at roughly the same rate as population increase in the province. However, imports of clothing have risen to a greater degree, and in 1954 stood at an estimated \$59 million, compared to production within the province of \$8⁰ million. Imports included \$17 million worth of women's and children's garments, \$12 million of

* The Alberta Bureau of Statistics estimates \$8.8 million for clothing manufacture in 1957.

men's clothing, and \$3 million of fur goods.

As freight charges are a relatively small consideration in retail clothing prices, the Alberta manufacturer has to meet competition in respect to both price and style from producers outside the province. However, another province, Manitoba, with a smaller population than Alberta, illustrates what may be done in this industrial field by prairie manufacturers:

	Population 1956 Census	Gross Value of Output in Clothing Industry 1955
Alberta	- 1,123,000	\$ 7.7 million
Manitoba	- 850,000	42.2 million

It would appear that this industry has definite expansion possibilities.

Textiles

Textiles have had a healthy growth rate in the past: between 1949 and 1955 output value rose from \$2 million to over \$5 million, and for 1957 it has been estimated at \$6 million.

In 1955, six Edmonton and four Calgary awning, tent, and sailmakers sold over half a million dollars' worth of goods. Two crest and pennant manufacturers at Edmonton and one at Calgary (both classified under Embroidery, Pleating and Hemstitching) made shipments valued at \$64,000. Each of these 11 firms employed ten persons or less. Their combined output was 15 per cent of the total for the industry group.

Two firms, classified under "Miscellaneous Textiles", manufacture wipers, saddle blankets, etc. Two further firms manufacture cotton and jute bags; these establishments are located at Calgary, and employ 16-25 and 26-50 persons respectively.

The two most important establishments in the industry group, for which separate statistics are not published, manufacture synthetic textiles. One is the company manufacturing glass fibre at Fort Saskatchewan. The largest of all Alberta textile establishments is the chemical firm at Edmonton whose operations were discussed under Chemicals and Allied Products. The plant's textile area pro-

duces cellulose acetate yarn and fibre as well as Arnel, a triacetate fibre.

The production of further textile yarns from petrochemicals appears likely and presents the best opportunity for an accelerated growth rate of the industry's production.

Non-Ferrous Metal Products

The output value of the Non-Ferrous Metal Products industry group rose as follows in recent years for which statistics are available:

	Thousand Dollars
1953	1,462
1954	3,614
1955	15,164
1956	17,442
1957	22,000 (estimated)

The marked rise in production was due to the commencement of operations by the chemical-metallurgical plant at Fort Saskatchewan during 1954. This plant has a labour force of between 600 and 700, while the remaining twelve firms in the industry group, located at Calgary and Edmonton, employ about 100 persons. The latter firms manufacture aluminum and bronze castings, aluminum awnings, dies and stamps, jewellery, and miscellaneous products, valued annually at some \$1.5 million.

The Fort Saskatchewan refinery has a production capacity of about 21 million pounds of nickel and three million pounds of cobalt per year.

Nickel concentrate is received at the plant at a rate of more than 250 tons per day from the company's mills in Northern Manitoba, some 900 miles distant. The fact that economic operation is possible in spite of a long rail haul of both raw materials and end products indicates the economies afforded by low cost Alberta natural gas.

For the whole of the industry group a gross production value of \$125 million is forecast for

1975. Smelting and refining operations are expected to account for nine-tenths of this output. The forecast is based largely on the assumption that by 1975 uranium refining will be undertaken in Alberta. While at present most uranium is shipped as a concentrate to Great Britain and the United States, Canadian output of the concentrate is likely to exceed net United States demand in the near future; Canada will then tend to become a major supplier of nuclear fuel for atomic reactors throughout the world. Alberta, situated on the direct line of communication between the uranium mining areas of Northern Saskatchewan and the Northwest Territories and Pacific ports, can expect to be chosen as the site for refineries, in view of her low cost fuel and power supplies.

Electrical Apparatus and Supplies

Electrical Apparatus and Supplies have had the most rapid growth rate of any industry group between 1949 and 1957. Annual increases in factory sales have been as follows:

Year	Factory Sales (thousand dollars)
1949	40
1950	65
1951	196
1952	465
1953	572
1954	972
1955	3,088
1956	3,877
1957	3,500 (estimated)

Of the ten establishments in the industry in 1957, five manufactured storage batteries, two made heavy electrical machinery and equipment, one made telecommunications equipment, and one made oilfield electrical equipment.

The storage battery firms, all of which are located at Calgary, manufacture batteries for cars, trucks and tractors. The batteries are sold in Manitoba, Saskatchewan and British Columbia, as well as in Alberta.

One of the firms in the heavy electrical equipment industry produces transformers at Red Deer. Originally sited to supply the farm electrification program, the firm has added supply to the oilfields to its business. The other firm, located at Edmonton, manufactures panel boards, switchgear, and similar items. The two remaining firms in the industry group are located at Calgary and Edmonton respectively. One firm in Edmonton produces insulated wire from imported copper wire.

The development of the industry in recent years has included the establishment of branch assembly plants in Alberta by electronics firms already operating elsewhere in Canada or the United States. This development is likely to continue.

Leather Products

The "primary" section of this industry group is leather tanning. In spite of the advantageous supply of animal hides and skins in Alberta, the province until recently produced only one-twentieth of one per cent of total Canadian leather production, while the proportions for Ontario and Quebec are 87 and 10 per cent respectively. A larger scale tannery, constructed at an investment of \$750,000, went into operation at Edmonton early in 1957 and will greatly increase the relative importance of this industry.

The "secondary" leather industries employ a total of some 40 persons. In 1957 it comprised one manufacturer of gloves, mittens, and welding suits, at Edmonton. Four firms at Edmonton and two at Calgary produce various leather goods including saddles and harness, trunks and suitcases, belts and purses.

Knitting Mills

Alberta's smallest industry group, Knitting Mills, comprises one hosiery and sweater manufacturer, located at Calgary and employing between 25 and 50 persons. Four other establishments at Calgary, Edmonton and Lethbridge produce sweaters and miscellaneous knitted garments. The industry group's output value decreased by 27 per cent between 1949 and 1956, from \$366,000 to \$274,000 (\$300,000 estimated for 1957).

Miscellaneous Industries

The remaining manufacturing industries represented in Alberta are classified in the Miscellaneous Industries group. The largest of these is the Electrical Goods industry, whose revenue from shipments, contracts, custom work and repair amounted to \$3.8 million in 1956.

Of other industries in this group, the Plastic Products industry in particular appears to have good future prospects. This type of manufactur-

ing is carried on by four small plants in the Edmonton and Calgary districts, and by two larger establishments located at Edmonton. The capacity of one of the Edmonton plants, completed in 1956, is one million pounds per year of cellulose acetate butyrate petroleum piping and polyethylene water piping, expanded tubing and vapour barrier. The increased production of primary plastics in Alberta will tend to encourage the growth of plastics products output. A molded rubber and extrusion goods plant is located in Edmonton to serve the oil industry.

SUMMARY OF PREDICTIONS OF GROWTH

In surveying the different manufacturing groups and individual industries, the preceding paragraphs have in most cases included forecasts of 1975 output. It is now time to bring these forecasts together and provide an overall picture of the expected level of manufacturing activity in Alberta in 1975.

The gross value of manufacturing production forecast for 1975 is \$2 billion over three times the corresponding 1955 figure*. Table IV summarizes the expected output of major industrial groups, and their relative importance, in that year.

Predictions for these industry groups indicate that while the Foods and Beverages group will be relatively less important, it will retain its position as Alberta's leading manufacturing group. Manufactured Products of Petroleum and Coal are expected to increase slightly in relative importance, retaining their rank as second in gross output value. It is forecast that Iron and Steel Products, now ranking third with six per cent of total manufacturing sales, will be in fourth place, increasing their percentage of total sales to ten by 1975. Also expected to increase in relative importance, from fifth place in 1957 to third in 1975, is the Chemicals and Allied Products group, which is expected to produce one-tenth of all manufactures in 1975 as compared to six per cent in 1957. On the other

hand it is forecast that Wood Products, the fourth leading group in 1957, will decline in relative importance with its contribution to total manufacturing production falling from eight to five per cent.

Other notable changes anticipated are substantial development in pulp production and non-ferrous metal smelting and refining. The groups including these industries contributed only 2 per cent each to total manufacturing sales values in 1955, and less than 3 per cent in 1957; their 1975 contributions are rated at six and four per cent respectively.

The impressive growth rates shown by Pulp and Paper Products and Non-Ferrous Metal Products are partly attributable to the fact that both these groups start from small bases in 1954. In that year, official statistics record no production of pulp and very small non-ferrous smelting and refining; now these two manufacturing groups are already of important size. Similarly, the chemicals group's high forecast average growth rate is partly attributable to new plants for basic chemicals production coming into operation after 1954. The Iron and Steel Products group's growth is influenced by the introduction of primary steel production to Alberta after 1954. The older, established industries are expected to grow at average annual rates of between three and seven per cent.

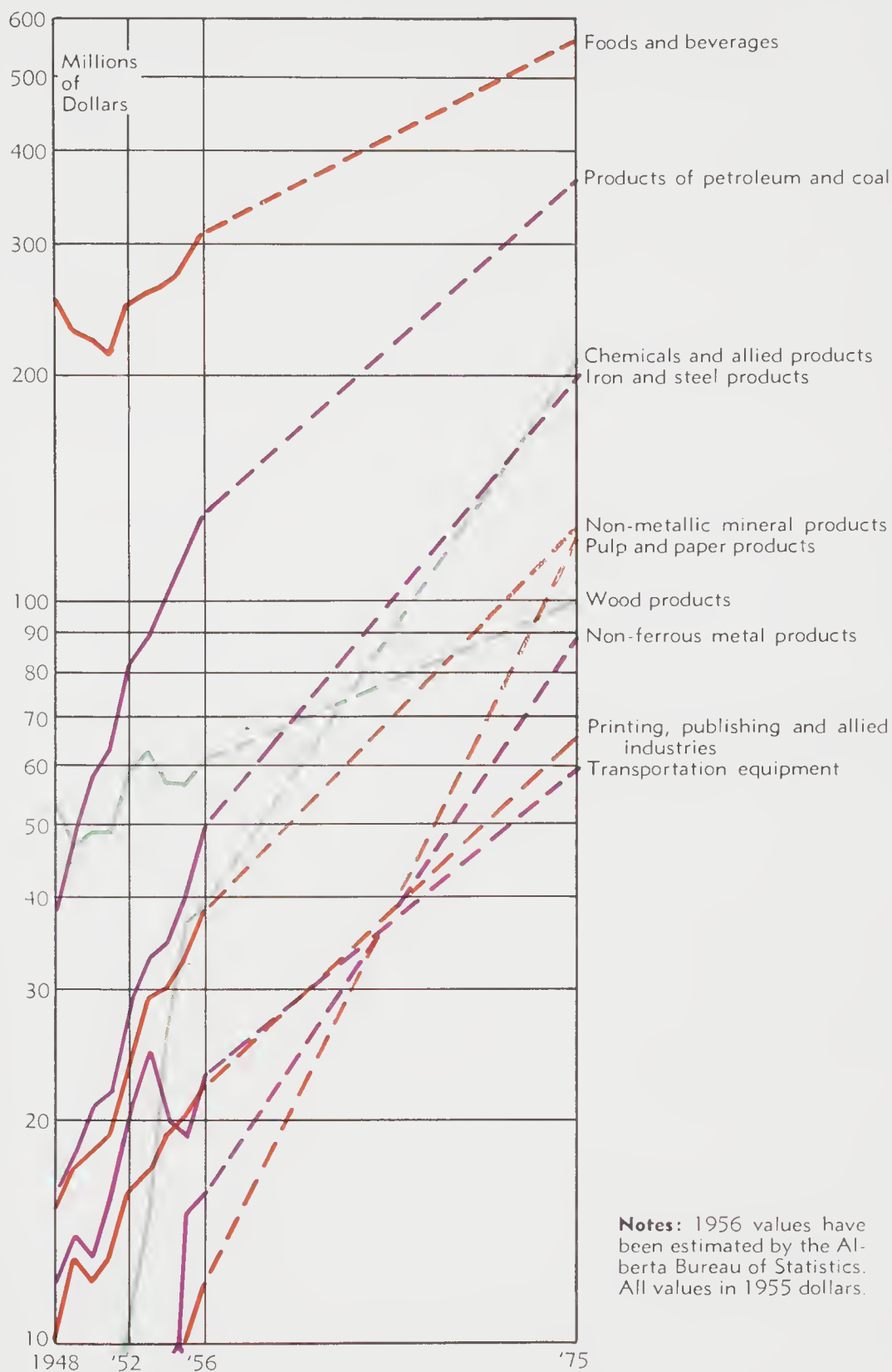
* This is in agreement with the forecast of \$800 million for total *net* manufacturing production in 1975, which is developed later in Chapter VII.

TABLE IV

MANUFACTURING PRODUCTION IN ALBERTA — 1975 FORECAST

INDUSTRY GROUP	1955			1975			Average Annual Growth Per cent
	Value Millions of Dollars	Percentage of Total	Value Millions of Dollars	Percentage of Total	Percentage Increase 1955-1975		
Foods and beverages -	273	43	560	28	105	3.7	
Products of petroleum and coal -	116	18	370	19	219	6.0	
Wood products -	57	9	100	5	75	2.9	
Iron and steel products -	41	6	200	10	388	8.3	
Chemicals and allied products -	37	6	210	10	468	8.1	
Non-metallic mineral products -	33	5	125	7	279	6.9	
Printing, publishing and allied industries -	21	3	65	3	210	5.8	
Transportation equipment -	19	3	60	3	216	5.9	
Non-ferrous metal products -	15	2	90	4	500	9.4	
Pulp and paper products -	10	2	120	6	1,100	13.2	
Other manufacturing industries -	19	3	100	5	426	8.7	
Total -	641	100	2,000	100	212	5.9	

FORECAST OF PRINCIPAL MANUFACTURING INDUSTRY GROUPS, ALBERTA, 1975



PRINCIPAL MANUFACTURING INDUSTRY GROUPS IN ALBERTA — FORECAST OF AVERAGE ANNUAL GROWTH RATE 1955-1975



CHAPTER VI

ALBERTA SERVICE INDUSTRIES

Page

Construction	217
Building Construction	217
Engineering Construction	221
Wholesale and Retail Trade	222
Wholesale Trade	222
Retail Trade	222
Finance, Insurance and Real Estate	228
Finance	228
Insurance	228
Real Estate	231
Service Establishments	231

CHARTS AND MAPS

Percentage Analysis of Value of Construction Work 1956	219
Retail Trade in Canada Sales Percentage Change 1946-1956	223
Retail Sales and Personal Income in Alberta 1930-1956	223
Retail Trade in Alberta 1956	225
Total Insurance Premiums and Disbursements (excluding Fraternal Societies) in Alberta	229

TABLES OF INFORMATION

Table I Per Capita Value of Construction by Provinces 1956 and Per Capita Value of Construction Alberta and Rest of Canada, 1951-56	218
Table II Sales by Wholesalers Proper in Alberta 1955-56 By Type	227

CHAPTER VI

ALBERTA SERVICE INDUSTRIES

The service industries of an area provide not only personal services and amenities to the population, but also a range of essential facilities for industry. Construction, the most important of these, has seen remarkable growth in Alberta of recent years. Financial, insurance, real estate and similar services are well represented, as are whole-

sale and retail trade, and repair and maintenance facilities of a variety of types.

Alberta's service industries are briefly reviewed in this chapter for the information both of the reader who may anticipate making use of them, and the reader who may be interested in supplying new or added services.

CONSTRUCTION

Construction has been Alberta's most important industry group since 1954, when its annual net production value first exceeded that of any other group. Construction value per head of population is substantially greater in Alberta than in the rest of Canada. Table I lists per capita values by province in 1956, and for Alberta and the rest of Canada in each of the years 1951-1956. The labour force employed on construction stood at 59,000 in 1956, compared to 53,000 in 1955 and 51,000 in 1954.

Types of construction are divided statistically into two groups, building construction and engineering construction. In 1951, building construction accounted for slightly more and engineering

construction for slightly less than half the total value of work performed. By 1956 this position had been reversed, though in intervening years the two groups contributed to the total value of work performed in almost equal proportions. In all of Canada, building construction predominated throughout this period in the approximate proportion of three to two. Alberta's relatively greater engineering construction program is indicative of the province's rapid rate of industrial development. Residential construction accounts for only one-fifth of total work done in Alberta, as against one-third in Canada. Gas and Oil Facilities represent more than one-fifth of Alberta's construction work, as against only one-sixteenth in Canada.

Building Construction*

New erections of residential buildings in 1956^{*} were valued at \$134 million, and repairs at \$22 million. The number of dwellings started was 10,700 (11,182), the number of completions 11,600 (9,948), and 5,200 (5,985) units were under construction at the end of the year. Of the units completed in 1956 some 3,300 (2,957) were in Edmonton, 3,900 (2,919) in Calgary, and 4,400 (4,072) in other localities. One-third of the units completed in 1954 were built with the assistance of Federal Government loans. Credit financing tightened in 1956, but in spite of this the number of dwelling units completed exceeded the 1955 figure by one thousand. Dwelling starts in 1956 were up by over 100 compared to the previous year.

In commercial building construction, 1956 con-

tract awards exceeded those of 1955 by 40 per cent in value, so that the immediate outlook for this sector of the Construction industry is optimistic. The main structures in this category are office buildings (\$24 million in 1956), retail and wholesale stores (\$11 million), and warehouses (\$8 million). Other projects include grain elevators, hotels, clubs and restaurants, garages and service stations, theatres and recreational buildings. New construction in this sector amounted to \$51 million and repair work to \$8 million in 1956.

Institutional building has provided six per cent of total construction activity in the province from 1952 to 1956. In 1956, schools accounted for \$26 million, hospitals and other medical institutions for \$10 million. Of \$46 million of work performed during the year, \$43 million was new construction.

* 1957 figures in brackets.

TABLE I

PER CAPITA VALUE OF CONSTRUCTION - BY PROVINCES, 1956

PROVINCE								Value of Construction Work (Millions of Dollars)	Population 1956 Census (Thousands)	Per capita value of Construction Work (\$)
Newfoundland	-	-	-	-	-	-	-	81	415	195
Prince Edward Island	-	-	-	-	-	-	-	17	99	172
Nova Scotia	-	-	-	-	-	-	-	148	695	213
New Brunswick	-	-	-	-	-	-	-	167	555	301
Quebec	-	-	-	-	-	-	-	1,530	4,628	331
Ontario	-	-	-	-	-	-	-	2,194	5,405	406
Manitoba	-	-	-	-	-	-	-	311	850	366
Saskatchewan	-	-	-	-	-	-	-	363	881	412
Alberta	-	-	-	-	-	-	-	748	1,123	666
British Columbia	-	-	-	-	-	-	-	830	1,398	594

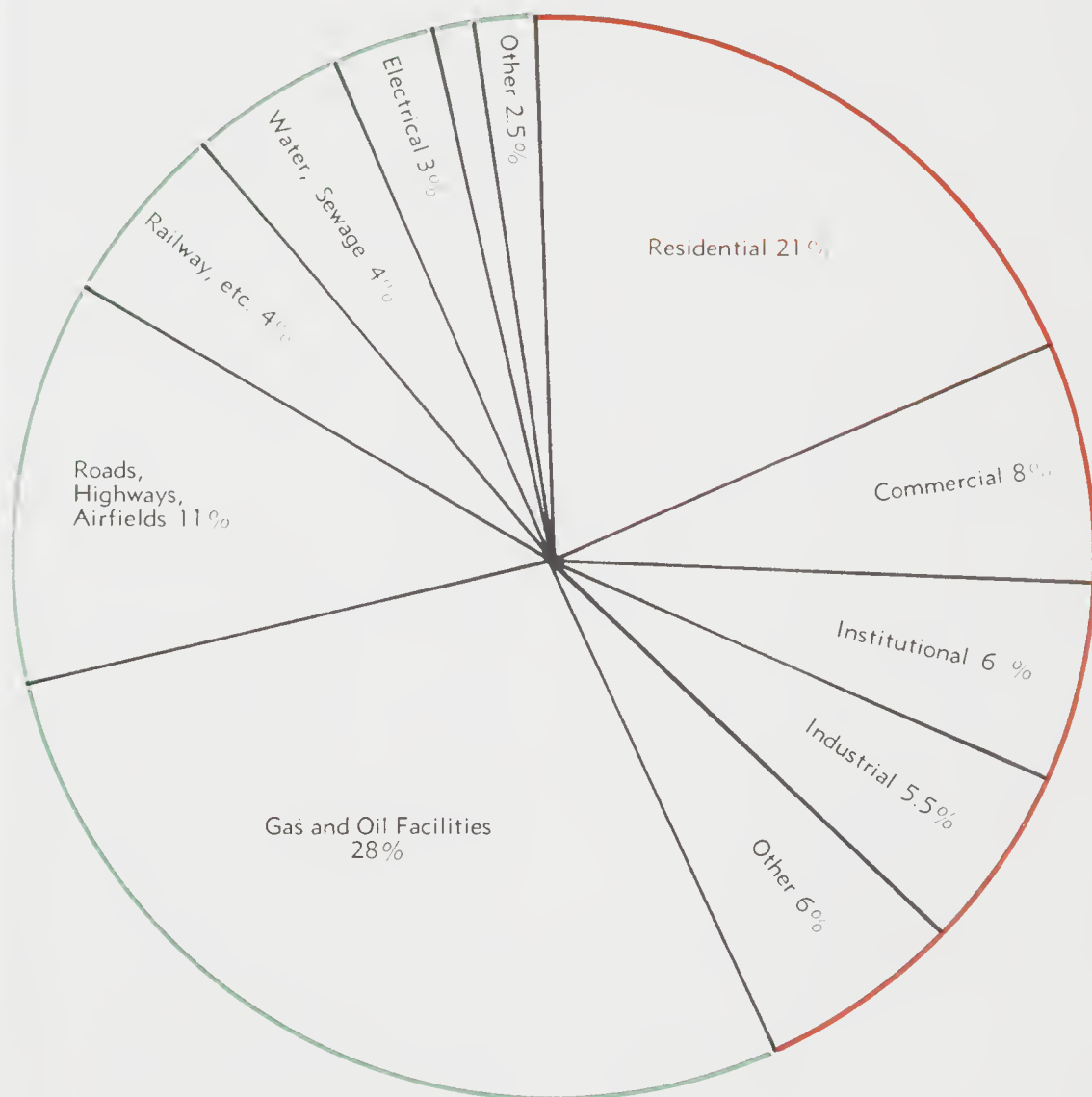
PER CAPITA VALUE OF CONSTRUCTION
ALBERTA AND REST OF CANADA, 1951-56

Year	Alberta				Rest of Canada			
		Value of Work (Millions of Dollars)	Population (Thousands)	Per Capita Value (\$)		Value of Work (Millions of Dollars)	Population (Thousands)	Per Capita Value (\$)
1951	-	379	939	404	-	3,282	13,070	251
1952	-	479	973	492	-	3,720	13,486	276
1953	-	556	1,012	549	-	4,084	13,833	295
1954	-	550	1,057	520	-	4,173	14,230	293
1955	-	624	1,091	572	-	4,687	14,607	321
1956	-	748	1,123	666	-	5,641	14,958	377

CONSTRUCTION IN ALBERTA

ANALYSIS OF VALUE OF CONSTRUCTION WORK 1956 ALBERTA

Dams and Irrigation 1%



Engineering Construction



Building Construction

Factories, plants, workshops and food canneries accounted for \$35 million out of a total of \$40 million of industrial construction undertaken in 1956. The balance represents construction costs of mine buildings, railway stations and workshops, engine houses, water and fuel stations.

The proportion of industrial building to total construction work done in the province has varied as follows in recent years:

Year	1951	1952	1953	1954	1955	1956
Per cent	8	9	5	3	4	5

The short-term outlook for industrial construction appears to be a continuance of this general trend. Industrial construction contracts in 1956 fell off by 47 per cent, while contract awards for other structural types increased or remained at the previous year's level.

Other building construction consists mainly of farm buildings (\$25 million in 1956), broadcasting stations and transmitters, telephone exchanges (\$12 million), and military structures (\$4 million). Some \$12 million out of a total of \$45 million was new construction.

Engineering Construction

The most important sub-group included here is Gas and Oil Facilities. Two-thirds of the value of this type of construction in 1956 was the cost of oil well engineering. Oil pipeline, gas pipelines, and natural gas cleaning plant construction came next in order of importance: the value of work performed on each amounted to approximately \$13.5 million out of a total cost of \$210 million for work done in this sector. Lesser amounts were expended on gas wells (\$10 million), refinery processing units (\$8.5 million), oil storage tanks (\$7 million), pumping stations and gas mains. All but \$7 million was for new construction. Further increases are likely in the next two years with the expansion of Gas Transmission lines including the start of construction of the Alberta Gas Trunk line and expansion of the Trans Mountain oil pipeline, as well as a planned increase of 9,000 barrels per day in refinery capacity. In addition to the upsurge in gas and oil engineering construction within the province, contractors in Alberta participate in pipeline projects outside her borders which are not covered by the statistics quoted here.

The proportion of total construction represented by road, highway and airport engineering work remained at eleven per cent from 1954 to 1956, indicating that the highways program was keeping pace with general expansion.

In 1956, work performed was valued at \$83 million. Half of this consisted of hard surfacing and paving of streets, highways, parking lots, etc., new construction of which amounted to \$37 million and repairs to \$4 million. Next in importance came gravel and stone surfaced thoroughfares, where new construction amounted to \$16 million and repairs to \$12 million. Other projects in this sector were dirt-surfaced roads (\$7 million), sidewalks (\$3 million), and tarmac airfields (\$399,000). The budget for the Trans Canada Highway, provincial, and district highways for the fiscal year 1957-1958 exceeded that of the previous year by \$4.5 million, no decline in road construction appears likely in the near future.

Of \$30 million spent on railway, telegraph and telephone construction during 1956, two-thirds was cost of tracks and rail roadbeds, and one-third was cost of line and cable-laying. More than half of the railways' expenditure is classified as repair work.

Waterworks and sewage systems have since 1951 represented between three and five per cent of the annual value of construction work performed in the province. Of \$28 million costs in 1956, \$25 million was new construction. The main projects were sewage systems and connections (\$18 million) and water service installations (\$7 million).

Between two and four per cent of total construction work has in recent years consisted of electric power installations. Of \$22 million worth of work carried out in 1956, 90 per cent was on new installations. Projects comprised power lines (\$13 million), power generating plants, including water conveying and controlling structures (\$5 million), transformer stations (\$2 million) and street lighting (\$1 million).

Dams and irrigation schemes have represented from one to three per cent of total construction in recent years. As in the case of electric power projects, 90 per cent consisted of new installations. Irrigation and land reclamation valued at \$8 million, and dam and reservoir construction at \$1 million, made up the 1956 total of \$9 million of work performed.

Miscellaneous engineering works include bridge, culvert and viaduct construction, which form part of the road building program; three-fourths of miscellaneous engineering construction consisted of bridging. Projects of lesser value included marine construction, tunnels, subways, incinerators, parks, recreational grounds, below-surface workings, fences, snowsheds, signs and guard-rails. New construction in 1956 was valued at \$13 million, repairs at half that amount.

WHOLESALE AND RETAIL TRADE

Wholesale Trade

The value of wholesale sales in Alberta has risen as follows in recent years:

Year	Millions of Dollars
1941	120.6
1951	392.6
1955	681.5
1956	793.7

"Wholesalers proper", whose sales are recorded above, are licensed by the Alberta Department of Industries and Labour. These are businesses maintaining stocks of merchandise in Alberta. The Alberta Census of Distribution also publishes statistics of other wholesale establishments, such as agents and brokers, but these data are not examined in this paper.

It is estimated that Edmonton and Calgary account for between 75 and 80 per cent of total wholesale sales in the province, and that turnover figures for 1955-1956 were as follows:

	1955	1956
	Millions of Dollars	Millions of Dollars
Edmonton	340	400
Calgary	185	220

Other major wholesale centres are Drumheller, Grande Prairie, Lethbridge, Lloydminster, Medicine Hat, Peace River and Red Deer.

Table II shows 1955 and 1956 sales figures by commodity groups. All types of wholesalers showed increases in 1956 over 1955, even in the field of farm machinery which had been relatively depressed in 1953 and 1954; the 1956/1955 increase amounted to 14 per cent.*

Retail Trade

Retail sales in Alberta have followed closely the rate of change of total personal income. Since the end of World War II they have risen steadily in each year, with the exception of a minor recession in 1954. The rate of growth of sales in Alberta has exceeded that in all other Canadian provinces; from 1946 through 1956, the average yearly increase was some six per cent, compared to a rate of some three and one-half per cent for the whole of Canada.

Independent stores have a greater share of sales in Alberta than in Canada as a whole. In recent years non-chain store sales have accounted for 80-87 per cent of total retail sales values in Alberta, compared to a proportion of 81-84 per cent in Canada. The greater relative importance of independent stores is probably due to the proportionately larger rural settlement of Alberta.

Motor vehicle dealers conduct Alberta's most valuable individual retail business, as they do also in British Columbia and Saskatchewan—grocery and combination stores are the premier retail business in all more easterly provinces. Furniture, appliance, and radio dealers are the trade with the greatest growth rate of sales from 1951 through 1956, averaging 16 per cent per annum. Other trades with above average sales increase rates are garages and filling stations, variety stores, grocery and combination stores, department stores and shoe stores.

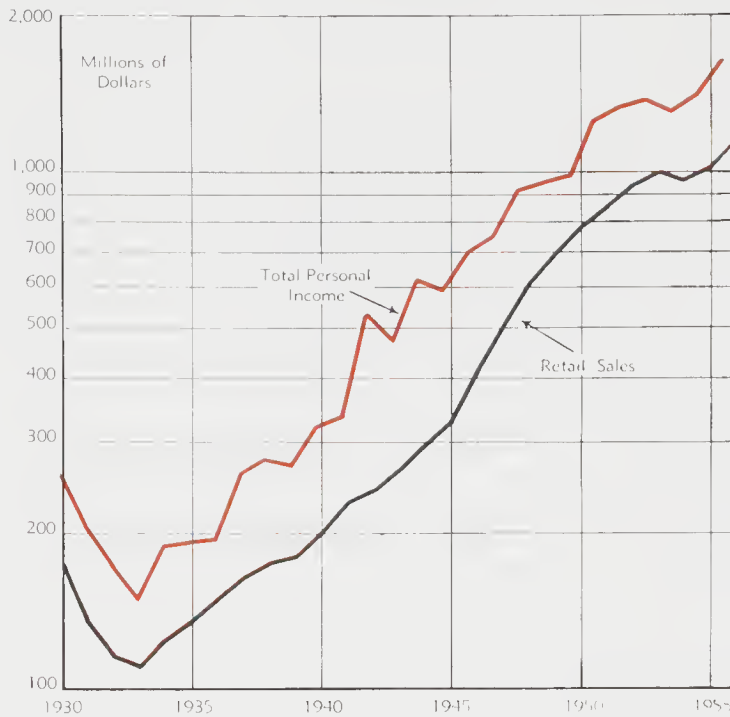
Alberta's population in 1956 was seven per cent of Canada's total, her retail sales were eight per cent of the Canadian retail turnover, and new motor vehicle sales in the province were 7.8 per cent of the Canadian total for passenger cars, and 12 per cent for commercial vehicles. The number of passenger cars retailed was 32,000, and their total value \$89 million. Some 11,000 commercial vehicles were sold for a total return of \$40 million.

In respect to both passenger and commercial vehicles, the percentages financed were greater in Alberta than in any other province. Some 54 per

* A schedule of wholesalers, classified by the products they sell, is contained in the *Trade Index of Wholesalers* published by the Alberta Department of Industries and Labour.

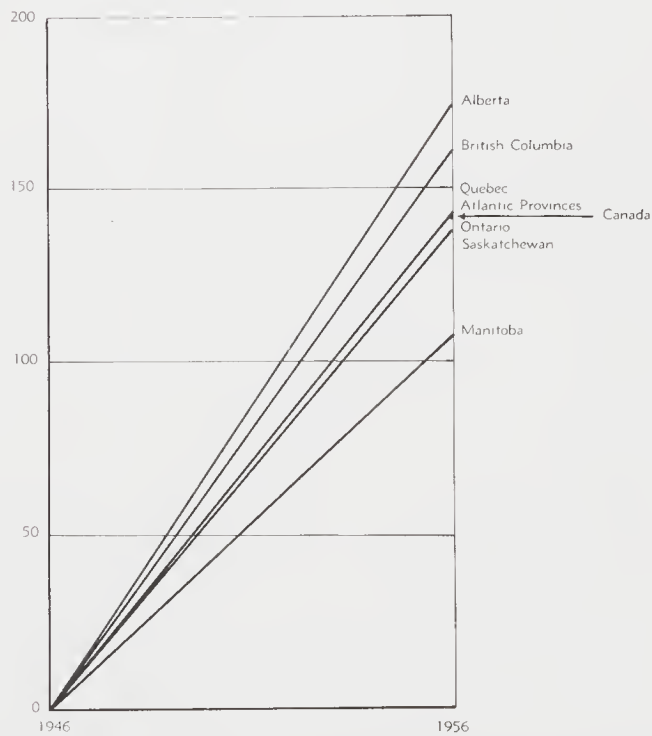
WHOLESALE AND RETAIL TRADES IN ALBERTA

RETAIL SALES AND PERSONAL INCOME IN ALBERTA, 1930-1956



WHOLESALE AND RETAIL TRADES IN ALBERTA

RETAIL TRADE IN CANADA — SALES PERCENTAGE CHANGE 1946-1956



WHOLESALE AND RETAIL TRADES IN ALBERTA

RETAIL TRADE IN ALBERTA, 1956



TABLE II

ALES BY WHOLESALERS PROPER IN ALBERTA IN 1955-1956, BY TYPE

<u>KIND OF BUSINESS</u>	1955	1956
Automotive Accessories, Equipment and Supplies - - -	97,005,719	124,132,109
Boots and Shoes - - - - - - - - - -	4,309,744	4,744,174
Drugs - - - - - - - - - -	8,830,520	9,359,938
Dry Goods - - - - - - - - - -	13,189,711	13,416,047
Electrical Appliances and Radios - - - - -	55,900,624	66,377,001
Florists - - - - - - - - - -	1,049,887	1,120,888
Furniture - - - - - - - - - -	3,370,844	3,722,897
Groceries (including Fruits and Vegetables) - - - -	165,469,614	183,045,898
Hardware - - - - - - - - - -	68,343,763	78,471,625
Jewellery and Silverware - - - - - - - - -	584,668	609,241
Lumber and Building Supplies - - - - - - - -	63,510,503	69,227,718
Machinery, Agricultural - - - - - - - - -	38,946,554	44,296,716
Machinery, Other - - - - - - - - - -	27,586,411	34,824,096
Paints and Varnishes - - - - - - - - - -	10,130,687	11,149,818
Paper - - - - - - - - - -	9,506,962	10,510,449
Tobacco - - - - - - - - - -	20,327,390	21,652,590
Oilfield Supplies - - - - - - - - - -	16,750,837	26,964,133
Carbonated Beverages - - - - - - - - - -	12,496,841	12,889,381
Miscellaneous - - - - - - - - - -	64,179,709	77,229,054
Total - - - - - - - - - -	681,490,988	793,743,773

cent of the quantity and 45 per cent of the value of all new vehicles sold in Alberta in 1956 were financed; for the whole of Canada these proportions were 45 and 36 per cent respectively. Used cars and used commercial vehicles were financed to the amounts of \$31 million and \$8 million respectively. As at March 31, 1957, there were 1,298 motor vehicle dealers licensed in the province.

Alberta department store sales since 1954 have increased at a greater rate than the sales of similar stores in any other province. Relevant figures are:

<u>PROVINCE</u>	Sales Increase 1955/54 (Percent)	Sales Increase 1956/55 (Percent)
CANADA	8.4	8.0
Atlantic Provinces	8.6	7.4
Quebec	9.1	5.2
Ontario	8.6	7.8
Manitoba	5.8	4.4
Saskatchewan	2.7	9.4
ALBERTA	10.6	12.0
British Columbia	8.8	10.8

FINANCE, INSURANCE, AND REAL ESTATE

Finance

Branches and sub-agencies of chartered banks in Alberta increased from 257 at December 31, 1951, to 329 at June 30, 1957. The breakdown of the latter figure by individual banks is as follows:

	Branches	Sub-Agencies
Bank of Montreal	61	15
Bank of Nova Scotia	41	2
Toronto-Dominion Bank	33	1
Canadian Bank of Commerce	63	5
Royal Bank of Canada	67	
Imperial Bank of Canada	37	4
	—	—
Total	302	27

The values of cheques cashed in Alberta clearing house centres in 1946, 1951 and 1956 are listed below. They illustrate the predominance of Calgary as a centre of financial activity in the province, both in present status and in growth rate since 1946.

TABLE III

CHEQUES CASHED AGAINST INDIVIDUAL ACCOUNTS

Clearing House (Millions of Dollars)	1946	1951	1956
	(Millions of Dollars)	(Millions of Dollars)	(Millions of Dollars)
Calgary	1,602	3,349	7,280
Edmonton	1,213	2,459	4,729
Lethbridge	147	310	491
Medicine Hat	75	124	177
	—	—	—
Total, Alberta	3,037	6,242	12,577

A similar picture of the relative importance of Calgary, Edmonton, Lethbridge and Medicine Hat as financial centres is shown when the value of cheques cashed in each of these cities is compared to the Canadian total of cheques cashed in clearing houses:

CHEQUES CASHED — PERCENTAGE OF CANADIAN TOTAL

Year	Calgary	Edmonton	Lethbridge	Medicine Hat
1946	2.31	1.75	0.21	0.11
1956	3.79	2.46	0.21	0.09

Several financial institutions specialize in the financing of retail purchases. In Alberta, in recent years, about one-half of goods financed by such firms were new or used passenger cars; other consumer goods represented from 10 to 15 per cent, and commercial and industrial goods from 35 to 42 per cent of the total. Alberta, in the 1951-56 period, led all other provinces in per capita amount of loans of this type.

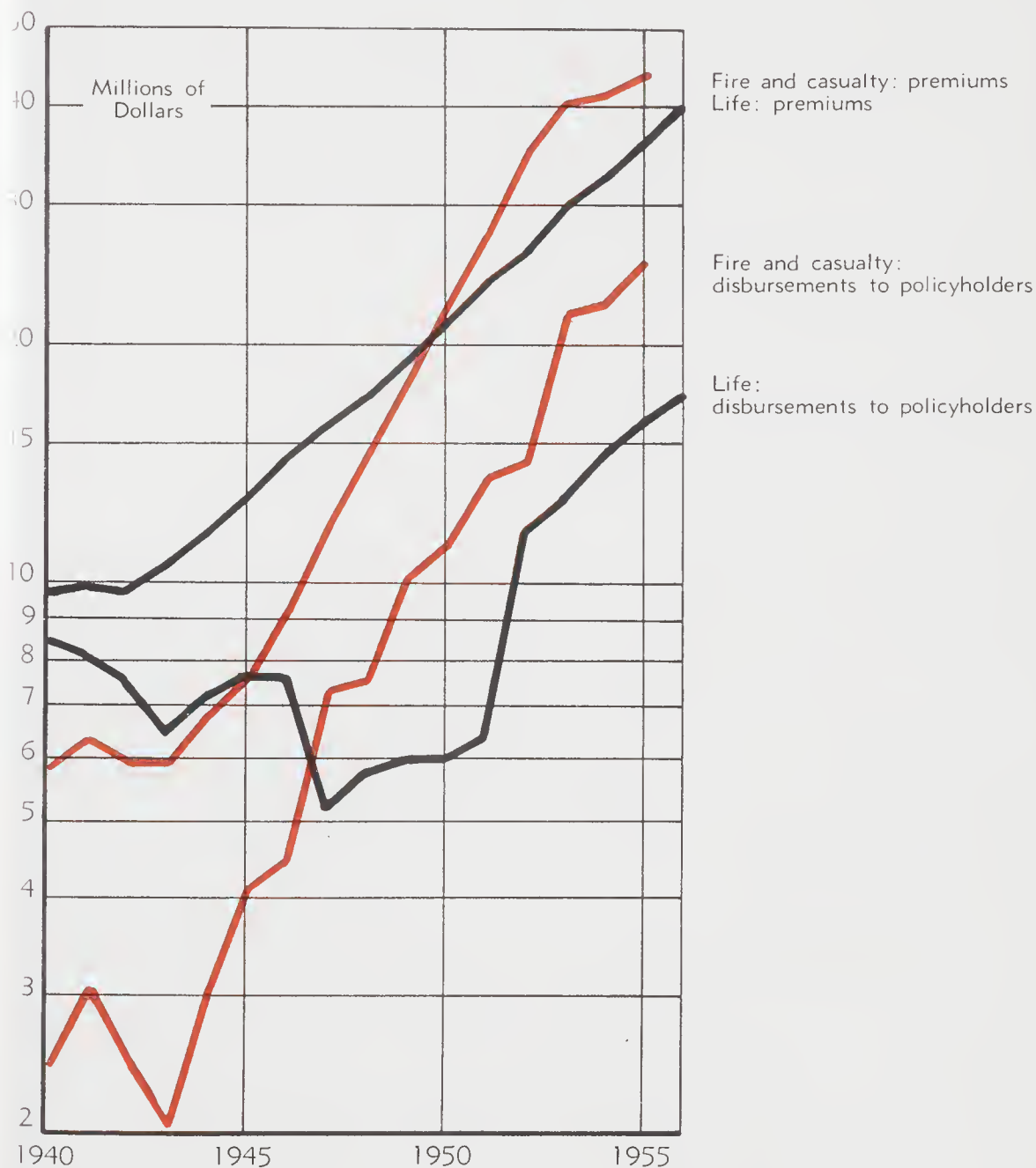
A stock exchange is located at Calgary and had 161 listings at May 31, 1957. During 1956 the Calgary Stock Exchange traded the fifth highest of the 24 exchanges in North America. By value of shares traded it ranked fourteenth.

Insurance

Insurance companies, agents and adjusters doing business in Alberta are subject to licensing and supervision by the Office of the Superintendent of Insurance, which forms part of the Department of

FINANCE, INSURANCE AND REAL ESTATE IN ALBERTA

TOTAL INSURANCE PREMIUMS AND DISBURSEMENTS (EXCLUDING FRATERNAL SOCIETIES) IN ALBERTA



SOURCE: Annual Report of the Superintendent of Insurance (Alberta)



the Provincial Secretary. This office publishes comprehensive annual reports on all classes of insurance. The reports show that life insurance premiums have increased annually at an almost constant rate of 11 per cent from 1942 through 1953. Fire and casualty premiums increased at twice that rate from 1943 through 1953, and by 2.5 and 5.6 per cent respectively from 1953-1954 and from 1954-1955.

Life insurance coverage at the end of 1955 was \$1,100 per capita in Alberta. The Canadian average was \$1,620 per capita and the Alberta figure was exceeded only in three other provinces. By the end of 1956, per capita life insurance coverage had increased to \$1,650 in Alberta.

Real Estate

The office of the Superintendent of Insurance of Alberta also licenses real estate agents and salesmen. During the two most recent licensing years

for which data are available the following numbers of each category were licensed in Alberta's cities and in the rest of the province:

Location	Agents		Salesmen	
	1955-1956	1956-1957	1955-1956	1956-1957
Edmonton	158	180	677	817
Calgary	134	137	512	560
Lethbridge	31	28	87	80
Medicine Hat	11	9	38	30
Drumheller	5	5	2	2
Red Deer	12	11	16	19
Wetaskiwin	7	6	6	4
Camrose	4	5	2	4
Towns and Villages	206	204	81	77
Total	568	585	1,421	1,593

SERVICE ESTABLISHMENTS

Types of establishments included in this category are classified in the following groups, amusement and recreational, such as motion picture theatres and bowling alleys; personal services, such as barber shops and shoe-repair shops; certain business services such as advertising agencies and window-display services; repair services such as auto repair, radio repair and watch repair; burial services; commercial and portrait photography; hotels and tourist camps; and other services such as cold-storage locker rentals and taxis.

Recent annual reports have been issued by the Dominion Bureau of Statistics only for hotels, laundries, cleaners and dyers, and motion picture theatres. The establishments in these classifications probably include those which produce the major portion (more than three-fifths) of the total value of services in Alberta.

From 1951 through 1955 receipts of the hotel industry increased by 13 per cent, those of the motion picture industry by 36 per cent, and those of laundries, cleaners and dyers by 44 per cent. Annual values 1951-1955 were as follows:

RECEIPTS OF SELECTED SERVICE INDUSTRIES OF ALBERTA (Thousands of Dollars)

Year	Hotels and Tourist Camps	Motion Picture Theatres, etc.	Laundries Cleaners, and Dyers
1951	45,038	6,714	6,318
1952	49,857	7,836	7,161
1953	52,900	8,890	7,873
1954	49,676	9,855	8,074
1955	50,318	9,130	9,100

Establishments serving meals, and with six or more rooms, are included in the hotel and tourist camps industry. Businesses include hotels, motels, hunting and fishing lodges, ski lodges and chalets, and dude ranches.

In 1951 there were 445 hotels with 14,000 rooms and 25,000 beds. By 1955* 450 hotels with just under 15,000 rooms (14,082 in hotels proper and

682 in cabins) had a bed capacity of some 27,000.

The number of power operated laundries and dry cleaning and dyeing plants rose from 113 in 1941 to 140 in 1955.* The latter year, the industry employed 580 men and 1,584 women, whose earnings exceeded \$4.3 million. Cost of materials and supplies used was \$1.0 million, and receipts totalled \$9.1 million.

* Latest Figures Available.

CHAPTER VII

FUTURE ECONOMIC GROWTH

	Page
Analysis of Growth	235
The Nature of Economic Development	236
Types of Economic Development	236
Requirements for the Development of Manufacturing Industry	237
Markets	237
Facilities	238
Forecasts of Growth	239
Agriculture	240
Mining	240
Manufacturing	241
Construction and Other Groups	241

TABLES OF INFORMATION

Table I	Net Value of Production in Alberta	251
Table II	Forecasts of Net Value of Production in Alberta	252

CHARTS AND MAPS

Net Value of Production of Major Industrial Sectors	243
Net Value of Production of Major Industrial Sectors on Semi Log	245
Percentage of Total Net Value of Production of Alberta contributed by Manufacturing and Construction 1942-46	247
Agriculture Alberta Net Values (1955 dollars)	249

CHAPTER VII

FUTURE ECONOMIC GROWTH

ANALYSIS OF GROWTH

The keynote of Alberta progress in recent years has been the diversification of economic activities. Since 1940, and especially since 1945, there has been very rapid and steady growth of Alberta mining, manufacturing and construction activities. Agriculture, while still one of the leading economic sectors, is far less dominant.

One important consequence is that serious declines in one sector of the economy can no longer cripple the province. The sharp, deep decline in agricultural output from 1927 to 1930 was a tragedy for Alberta. A decline of nearly equal magnitude from 1951 to 1954, while very grave for farmers, had less overall effect. Over the same period the losses in agricultural income were more than balanced by increases in construction, mining and manufacturing, so that there was actually an increase in the net production value of the Alberta economy.

This new resilience of the Alberta economy is of the highest importance. To be able to take a loss in net value of almost \$200 million in a leading industry over a period of three years, with little slowing up in the general progress of the province, is a remarkable achievement. It has been possible only because the economic base of the province has broadened very substantially, a fact which should be kept in mind by all who wish to help in creating a healthy economy.

The broadening process is going forward at three levels. First, wheat is playing a less prominent part in agriculture, with livestock becoming relatively more important. Second, mining and forestry are gaining relative to agriculture so that the primary industries are more varied. Thirdly, secondary production is gaining on primary production.

The decrease in the relative importance of wheat in the total agricultural production of the province has been very marked. In 1926, 64.8 per cent of all cash income from sale of farm products came from wheat. By 1941 the figure had fallen to 35.4 per cent, and by 1956 it was 26.6 per cent.

Since the war, Wheat Board payments must be added to this figure, but wheat has shown no tendency to regain its former position. There has been a shift in agricultural activity toward more intensive crops such as sugar beets and toward the raising of more animals, which implies more processing of crops on the farm. The trend toward diversification of agriculture is expected to continue, with vegetables, dairy products, poultry and eggs becoming more important. Farm income from cattle and hogs is now already considerably greater than that from wheat.

The increasing importance of activities other than agriculture is resulting in the broadening of primary industry. Mining is increasing at a faster rate than agriculture. Furthermore, the fact that mining production is rising nearly in a straight line shows that it is growing at a nearly constant rate; it is likely to continue to do so. Forestry, though still a small sector, is also growing more rapidly than agriculture.

To a very great extent, mining is itself dominated by a single commodity, petroleum. The production of petroleum encourages additional amounts of manufacturing and processing in a way that wheat does not. Hence petroleum is not likely to dominate the provincial economy to the extent that wheat once did.

While wheat is losing its dominance of agriculture, and agriculture is becoming less dominant among the industries, a further broadening factor is that the secondary industries are growing faster than the economy as a whole. Construction and manufacturing have been gaining on the other industries of the province since 1942, and in recent years the total net value of production of these two industries has been over 45 per cent of the total net value of all industries in the province.

This changing relative importance of the larger industrial sectors of Alberta is of great significance. Agriculture has been the main support of the Alberta economy since the province was settled.

The amount of income generated by this industry has been much greater than that from any other industry. But agriculture has been an unstable support because fluctuations in the values of farm products have been very great. Net value of production in agriculture increased from \$110 million in 1941 to \$260 million in 1942—more than doubling—or, to be exact, an increase of 236 per cent in one year. About a decade later, net value of production fell from the high position it had reached in 1951—\$500 million—to \$302 million in 1954, a fall of 40 per cent over three years. By 1956 it was \$397.2 million.

The year 1954 marked an important milestone on the road to diversification. In that year, agriculture fell from first place as the main support of the Alberta economy, and construction took its place. Agriculture regained some of its losses, in following years, but construction has remained in first place because of its still more rapid rate of growth. Furthermore, mining has moved up closely behind, and is likely to surpass both of its leaders soon. Manufacturing is growing at a somewhat less rapid pace, but it is experiencing steady growth, and may be expected to pass agriculture within a decade.

It is of major significance that construction, mining and manufacturing have been climbing steadily as well as steeply. Apparently they will continue to do so—this appears from a fitting of statistical trends, but it can be supported by knowledge of current events in Alberta. Alberta's economic future should show far less severe fluctuations in output, employment and income than has its past.

The Nature of Economic Development

Economic development is the process of making better use of economic resources—human, natural and capital; thus increasing the quantity of goods and services per capita available for sale or use. The usual tests applied are changes in income, spending, unemployment, or wage payments.

Not all areas are suitable for manufacturing or commercial development; some areas become specialized in a primary industry while other areas, because of a better location and a variety of resources, will attract a greater variety of economic

activity. Each section of the country should contribute in a manner appropriate to its resources.

If artificial stimulation is used to develop secondary industry in areas to which it is not suited, such industry will cease to prosper as soon as the stimulation is withdrawn. If the stimulation is continued, there is misuse of economic resources. If, on the other hand, the area has the necessary qualities, then stimulation may be applied to speed up the natural processes, though such stimulation if carried too far can be wasteful. On the same basis, of course, anything that artificially hampers natural development is also a misuse of resources.

It is generally appreciated that economic development takes place less rapidly, and economic laws operate less efficiently, than they might if all of us were more intelligent and knowledgeable. Anything that increases our knowledge and understanding of economic affairs should therefore lessen the chance of error and the chance of misusing resources. Economic research organizations can assist in sifting and assessing information, but only increased knowledge of actual resources, such as soils, minerals, or forests, is also invaluable.

The management function is also essential in development. An able and alert business leader may carry on successfully against handicaps, while less talented management may fail even when conditions are not particularly unfavourable. The successful manufacturers create jobs and distribute income, bring population and expand markets. They are an indispensable element in economic development, for no economy can show progress without the industrial leadership of those who have the will and the drive to progress.

Types of Economic Development

Economic development has a variety of patterns. Five important patterns are those in which development of a locality is fostered by commerce, agriculture, minerals, heavy industry, and light manufacturing. The examples which follow will illustrate these types of development and discuss their importance in Alberta.

A commercial centre is typically one which becomes a centre of trade for reasons dictated by economic geography. An example is Winnipeg.

which has long been the gateway to the Canadian West for the products of the east. It is also the concentration point for western produce moving east. Edmonton is in the same way the gateway to the north. Its airport is strategically located for air traffic to the Mackenzie River system, to Alaska, and to Asia. The river traffic of the Mackenzie River system, including freight to and from the more recent mining developments along the western edge of the Shield, feeds through Edmonton. The Peace River district and the Alaska Highway have their outlet through Edmonton. While the new road and rail connections with British Columbia outlets will make some difference here, these may well be offset by the growth in the Peace River area itself and by further mineral development in the Lake Athabasca-Mackenzie area. Edmonton will continue to enjoy a favoured commercial position.

The type of economic development based on rich surrounding agricultural lands is exemplified by Red Deer and Lethbridge. Red Deer, surrounded by rich black soil, has a climate suitable to a wide range of agricultural activity. Lethbridge, in a drier climate, is in a region where irrigated crops are successfully grown and will continue to increase in importance. Agriculture will continue to contribute to the growth of these and other centres in Alberta.

The type of development based on mineral wealth may be seen in such centres as Timmins in northern Ontario. Alberta's great mineral wealth in coal, gas, oil and other minerals will bring increasing prosperity to many localities in the province. Gas and oil are presently contributing very substantially to Alberta's development and the coal industry is expected to regain its former importance before many years pass. Exploration for gas and oil attracts large amounts of capital, which show up in the wage spendings of the exploration and drill-

ing crews, in the pipe, equipment and servicing that go into oil field development. In a following stage, pipelines are built, and refineries and dependent industries grow up. Edmonton, and Calgary, surrounded by oil and gas fields, now each have large chemical plants and several large refineries. The production of oil and gas does not require employment of large numbers of men, but utilization will generate employment.

The heavy industrial type of development is illustrated by the City of Hamilton. Hamilton has no coal, but can get it from Pennsylvania; its iron must be brought from many miles away. But it is close to major markets, and both coal and ore can be brought in cheaply by water. Scrap iron is convenient and power is available. No Alberta locality can claim to be so favoured for steel production. Plenty of good coal is available; some iron ore has been located in the province but remains unexploited, and a newly established steel mill in Edmonton operates on scrap iron. The continued growth of heavy industry will depend upon the growth of population and industry in the western half of the prairies. The Sherritt Gordon refinery at Fort Saskatchewan and the heavy chemical plants in Calgary and Edmonton present a different aspect. The presence of fuel and chemical raw materials draws heavy industry to produce for faraway markets. In this Alberta centres have some advantages, although the industries must pay substantial freight charges to these markets.

Light manufacturing follows population. There seems to be a certain minimum market requirement—not necessarily in one city, but in a combination of towns, cities, and country within easy reach. Alberta may have passed this point now with 400,000 people in two metropolitan areas and over a million in the whole province, particularly since their incomes are high and growing.

REQUIREMENTS FOR THE DEVELOPMENT OF MANUFACTURING INDUSTRY

If secondary industry or manufacturing is to develop further in Alberta, there must be both the motive and the means. The motive is, of course, to capture the markets, which may be within the province, within the prairie region, or further afield. The means, or facilities, include energy, raw materials, capital and manpower.

Markets

Bakeries, dairies, motion picture theatres, and drug stores will be found wherever there are people, even in very small towns. Such businesses grow with population, with incomes, with increasing commercialization of daily activities—baking,

laundering, cooking, cleaning, banking, religious and funeral services are more and more provided for outside the home. These economic activities do not in general exert any active location force, but tend to develop where population already exists.

Such commodities as bricks, beer, and electric power have provincial markets. Sometimes the market is limited by Government authority, and sometimes by the laws of economics, as in the case of bricks. The location of these plants is not so completely dominated by the market as in the previous group; indeed, the location of mineral or fuel resources, or transportation connections, will itself tend to influence the location of population within the province. The total quantity of production of these commodities will grow with population, incomes and economic activity in the province.

Such products as canned vegetables, cement, steel products and electrical apparatus have even wider distribution areas. As we consider progressively wider markets, plant location becomes less and less a passive factor merely following population, and more and more an active factor which itself affects the location of population. The population centre of the prairies has been shifting westward with the relatively faster growth of Alberta, as the result of such forces. The pull of Alberta's fuel and chemical resources is evident. The prairie population is in excess of three million and by 1971 is expected to reach four million; this is a very sizeable market for those Alberta goods which can capture it.

When British Columbia is added to the Prairie Provinces, the total population of this area is four and one-quarter million (1956), with the centre of gravity somewhere near the middle of Alberta. This is a strategic market area for some Alberta producers, covering 1,500 miles from Winnipeg on the east to Vancouver on the west. It includes four metropolitan areas of 200,000 or more, three of which have been the most rapidly growing metropolitan areas in the country. The population of the area is expected to be six million people in 1971. Alberta cities are favourably located with respect to much of this market area, although Mountain freight rates tend to restrict the movement of goods into the Vancouver area and to protect the secondary industries now established there.

If markets for Alberta's products were limited to Western Canada, then economic growth in

Alberta would be limited by growth in Western Canada. It is the ability to produce goods for export which enables relatively rapid growth of a region. People are attracted to Alberta to produce grain, meat, oil and gas, lumber and plywood and petrochemicals because these commodities can be produced cheaply enough to compete over wide areas. The ability of Alberta to produce them guarantees that people will be attracted to the area.

But as a producer for export, Alberta suffers because of its geographic isolation. It is heavily dependent upon rail transportation and sensitive to rail rate structures. The building of good roads will help to some extent, especially for high priced commodities, but trucks can compete in hauling large quantities of goods over long distances only in the case of some relatively high-priced items. The value of the resources of Alberta depends on economical transportation, even though the future will undoubtedly see a growing demand for these resources.

Facilities

Economic development requires a range of facilities. The first of these is energy supply; in this respect, Alberta is exceptionally well endowed. Its reserves of coal are the largest in Canada and form a substantial proportion of the entire continent's reserves. Coal quality is good, and it is very accessible at various places throughout the province. Natural gas has been found in such quantities that pipelines are under construction in both westerly and easterly directions. Gas will go to Toronto and Montreal, 2,000 miles away. Petroleum is being produced at the rate of 140 million barrels a year. Petrochemical plants have been attracted and there are opportunities for such fuel-hungry industries as nickel refineries, ceramic factories, and cement plants, the latter two to supply the prairie market.

Electricity is available at favourable rates which should be stable over a long period. The waters of Bow River and its tributaries are being well utilized for the generation of electricity, and there are plans for hydroelectric expansion. Thermal plants based on low-cost coal will ensure low-cost electric power for many years to come. There should be no shortage of electricity with such abundance of fuel.

The next industrial requirement is availability

of raw materials. It is clear that Alberta has an abundance of raw materials for the petroleum and petrochemical industries. Forest industries are flourishing, with pulp mills and plywood plants building up. Metallic ores are being found to the north and northeast of the province; more will undoubtedly be found. The province has salt, which is being used, and although few other minerals have yet been found in abundance, the search is being pressed. Silica sand, gypsum and volcanic ash are available, and other economic minerals will be discovered as exploration proceeds. Of course, agricultural products abound.

A third industrial requirement, an adequate labour supply, has been no problem in Alberta and is unlikely to become one. The outward population drift of the 1930's has been reversed, and people are now coming into Alberta from other provinces and from other countries. Any lack of specific skills is more than made up by the adaptability of the labour. Accustomed to mobility and adjustment, much of it familiar with farm machinery. Wages are not as high as in Ontario or British Columbia.

Industry must also have capital; but there has been no difficulty in obtaining capital to support oil and gas developments, petrochemical plants or the recently-erected pulp mill. The Alberta market is now attractive to national companies which are contemplating branches; and finally, the Alberta prosperity of the last decade or more has provided local capital in the hands of Alberta people themselves, which they may well be encouraged to invest in sound projects within their province.

The province is well supplied with railways, and its roads are being improved very rapidly; the province now ranks fourth in miles of paved roads in Canada. Its communications are good and taxes not unduly high; current legislation should overcome past complaints of unfairness. The province is, however, isolated to an extent. Calgary is 2,000 miles from the Montreal and Toronto markets, and 600 miles from Vancouver. Edmonton is a little further from both. The airplane has made a tremendous difference in the movement of people, and in the use of air express for special purposes. The improvement in the roads implies less complete dependence on the railroads and hence more flexibility in shipping arrangements.

FORECASTS OF GROWTH

The recent economic development of Alberta has been dramatic. The value of factory shipments for Canada as a whole, in 1956, was just over five and one-half times the value in 1939. The comparable figure for Alberta was seven and one-half. The growth in Alberta has been especially striking since the 1947 oil discoveries at Leduc, and has continued more strongly than ever since 1954.

The dynamic factor in Alberta's present rapid economic expansion is the new investment in oil exploration, production, transportation, and utilization. The large oil companies have estimated that oil will continue to be found at least as far ahead as 1975, and probably past 1985. This implies a continuous injection of new investment for the next 25 years. In part the effects will be cumulative since, as the supply of fuel and raw materials continues to accumulate, the total effect will be more weighty. Furthermore, continuance of the expansion will convince some earlier hangers-back. On the other hand, as economic activities in the province are broadened, the exploration activities probably will become of less relative importance. The overall

rate of growth of all industry in the province may become less rapid unless some other stimulating force is present.

The continued injection of new investment, not only for exploration but for production, transportation, and utilization, will have "multiplier" effects—that is, it will put money in the pockets of Albertans which, in turn, will be spent—adequate to continue the expansion at a fairly rapid rate. The economic development of the province will attract people from other provinces and from other countries, so that the population is quite sure to grow more rapidly than the natural increase alone would indicate. This increase in population will induce growth in secondary industry and services. Heavier industry will develop. The discovery of further mineral ores would be an added impetus. It seems certain that the Alberta economy will continue to grow at a rapid pace up to 1975, and perhaps for many more years. Growth after 1975, however, may be partly dependent on the successful establishment of new secondary manufacturing industries between now and that time.

Agriculture

The value of agricultural production varies greatly from year to year because of crop conditions and price variations. By using an index of wholesale prices of farm products for Western Canada, price changes can be eliminated from the data. A straight line trend, drawn through this deflated series to average out the remaining fluctuations, indicates a real average growth of five million dollars per year in farm output. The continuance of this growth rate over the next 20 years would result in an output figure of \$450 million for 1975. We cannot expect that this will be the precise figure, because of the variations characteristic of the industry; statistical theory predicts that the values in the years around 1975 should be between \$395 million and \$503 million two times out of three. That is, they will probably be higher than \$503 million or lower than \$395 million only one year out of three. Only once in 20 years would they be expected to be outside the range of \$340 million to \$557 million, if past growth conditions continue.

This forecast is lower than one made by the Alberta Bureau of Statistics, which showed net value of agricultural production in Alberta growing from \$483 million in 1952 to \$500 million in 1975. However, 1952 was an unusually high year, the second highest on record and not far short of the highest. When a trend line is drawn through the deflated series, the 1952 figure is seen to be 22 per cent above the trend line, and therefore a projection based on 1952 could be over-optimistic.

Our forecast shows, however, a substantial growth trend, so that the 1975 figure is nearly 50 per cent above that for 1954. In Chapter IV a forecast was made of the 1975 demand for each of Alberta's main agricultural products. If a properly weighted average is taken of the increases in these demands over the 1955 base, a general increase of 62 per cent is obtained. This can be regarded as fairly close agreement by two entirely different approaches.

It can be expected that the outputs of some of the main products will increase rapidly. Meat may double, and milk more than double in output. For

Alberta agriculture as a whole, the quantitative increase is expected to be about fifty per cent.

Mining

The net value of mining in 1975 is especially difficult to forecast, since the past history of mining in Alberta is an unreliable basis for future trends. In Chapter IV above, 1975 production by the principal components of mineral output has been estimated as discussed in the following paragraphs.

The production of petroleum in Alberta in 1955 was seen to be about 310,000 barrels per day, and it is estimated that this production will increase to between 1,350,000 and 1,760,000 barrels per day by 1975. The Preliminary Report of the Royal Commission on Canada's Economic Prospects estimates the "potential output of oil in 1980—at about ten times the 1955 production and between one and one-half times and twice the anticipated Canadian requirements in 1980". The Royal Commission Report refers to the production of the entire country, but does not make it clear whether the 1955 base figure is actual or potential production. Taking the base figure to be actual production, it is concluded that actual production in 1975 will be five and one-half times actual production in 1955, or 1,700,000 barrels per day.

It is considered that the production of natural gas in Alberta would rise from 133 thousand million cubic feet in 1955 to 1,350 thousand million in 1975, an increase of over ten times. Some increase is so likely to occur in well-head prices because of more developed marketing arrangements so that the value of the gas produced in that year could increase ten times over the 1955 total value. The Preliminary Report of the Royal Commission on Canada's Economic Prospects estimates an increase in the use of natural gas in Canada by 1980 of "ten or more times" the 1955 figure.

The production of coal is estimated to be slightly more in 1975 than it was in 1955, and the production of other minerals to increase from 6 to 40 million dollars.

The entire forecast picture, then, is as follows:

	1955 Production (millions of dollars)	Ratio 1975/1955	1975 Production (millions of dollars)
Petroleum - - - - -	275	5.5	1,513
Natural Gas - - - - -	10	10	100
Coal - - - - -	24	1.27	30
Other Minerals - - - - -	6	6.6	40
(not included: cement, clay products and salt)	---	---	---
Total - - - - -	315	5.8	1,683

The table indicates a total of \$1,683 million* of mineral production in 1975. But this is the gross value from which cost of fuel, electricity and supplies must be deducted to get the net value of production. Applying a relation which fits the 1953 and 1954 figures for mineral production in Alberta, we take 95 per cent of \$1,683 million to get \$1,599 million—say \$1,600 million in net value of mineral production for Alberta in 1975.

Manufacturing

The best measure of the development of the manufacturing industry is the growth in net values of production. These net value figures have increased fairly steadily from a low point of 18.88 million in 1933 to 279.19 million in 1956, but part of this increase resulted from rising prices over the period. If we choose the wholesale price index of Canada as an indicator of price change, we find that the 1956 price index is 2.58 times the 1933 index, and we may deflate the value increase by this ratio. The resulting estimate of the real change in net value of manufacturing gives a 1956 figure which is 5.35 times the 1933 figure. The real change accounts for almost twice as much of the increase as does the price change.

When the deflated net values of production were plotted on semi-logarithmic scale it became evident that a straight line trend fitted the points well. Such a line projected to 1975 gives a value of \$823 million for net manufacturing output. This figure might be considered optimistic because the first part of our trend line begins at a low point in 1933. After considering production forecasts for

the individual industries which comprise the manufacturing group, the final estimate is \$800 million.

Construction and Other Industrial Groups

Forecasting the construction industry 20 years hence on the basis of the last 18 years, the period for which net values of production are available, would not give reliable results. It is clear that there has been an upward bulge during recent years. This may well last for some future years, but the rate of increase is likely to assume a more normal pace before 20 years have passed. It has seemed best to derive a forecast by an indirect method. The figures forecast for the sectors discussed, plus additional ones for other industries, in terms of net values of production in 1975 are as follows:

	Millions of Dollars
Agriculture	450
Manufacturing	800
Mining	1,600
Electric Power	120
Forestry	30
Other	3

Total	3,003

A value of \$120 million is forecast for electric power output which implies a sixfold increase over 1952 and nearly fivefold increase over 1954. Therefore to forecast construction in 1975 if we include \$1,000 million for the net value of construction and add to the \$3,003 million this will

* In 1955 dollars.

make this economic sector a not unreasonable twenty-five per cent of a forecast total provincial net output of \$4,003 million. It also follows reasonably the trend of electric power. A summary of these forecast figures is given in Table II, with 1954 actual figures and measurements of the change over the period.

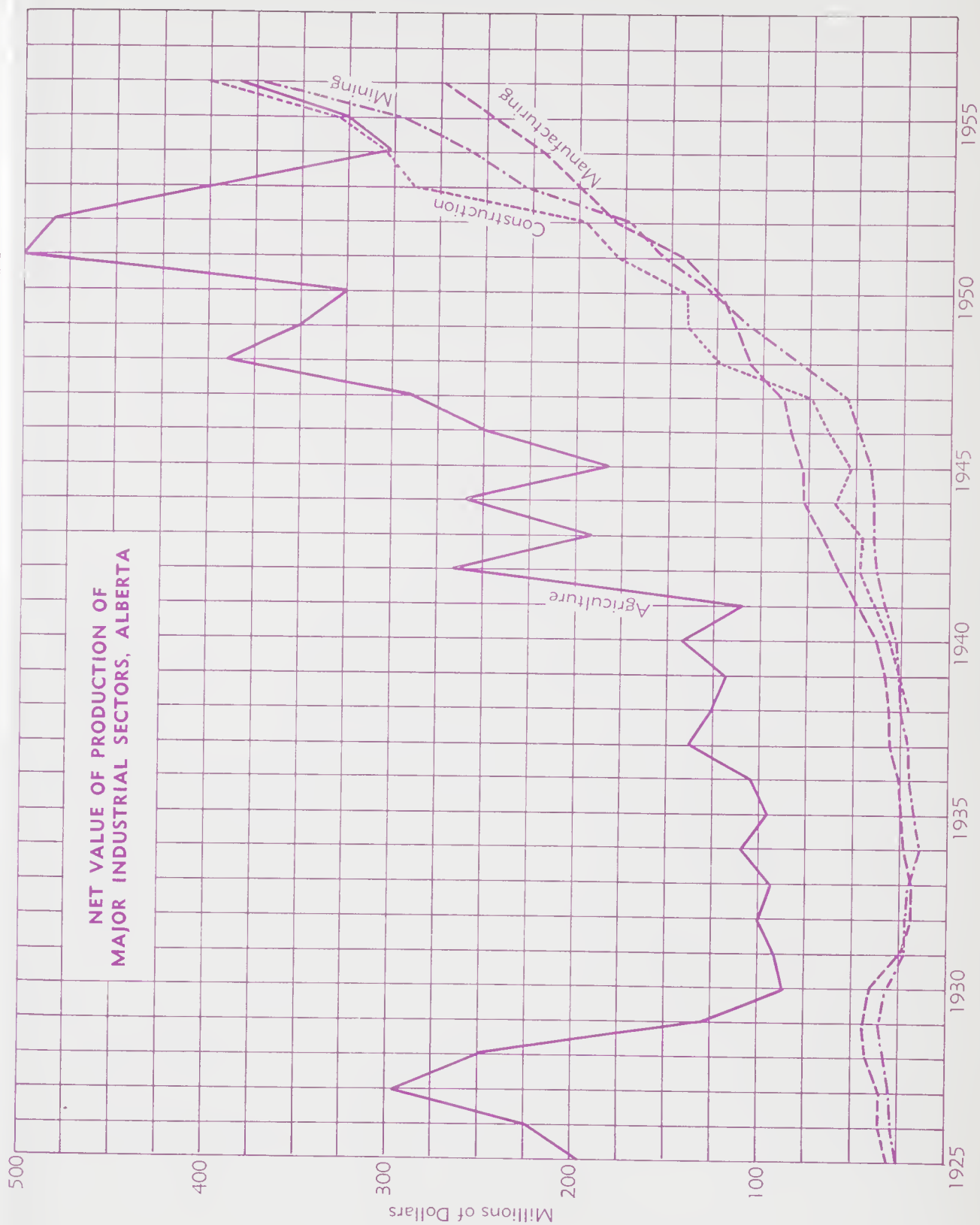
The greatest increase expected over the forecast period is in mining, which is estimated to exceed five times the 1954 value by 1975. Electric power production will increase rapidly. Manufacturing is expected to be 3.7 times the 1954 figure, a somewhat higher rate of growth than the Royal Commission on Canada's Economic Prospects has estimated for secondary manufacturing for the whole country. Forestry is expected to have a considerable growth, reaching three and one-half times

the base figure. Construction is expected to do better than triple, and agriculture should be, on the average, 50 per cent above the 1954 figure. The total for the province is forecast at 3.6 times the 1954 total, all in terms of quantity alone, with no allowance for price change.

Agriculture is therefore expected to decline in relative importance to 11 per cent of the total, while mining will climb to 40 per cent. Manufacturing moves up to 20 per cent but construction is to fall back to 25 per cent of the total.

The total net value of production is expected to increase from \$1,100 million in 1954 to \$4,000 million in 1975, or almost \$150 million each year. This is about the same rate of progress as that of recent years.

FUTURE INDUSTRIAL GROWTH IN ALBERTA

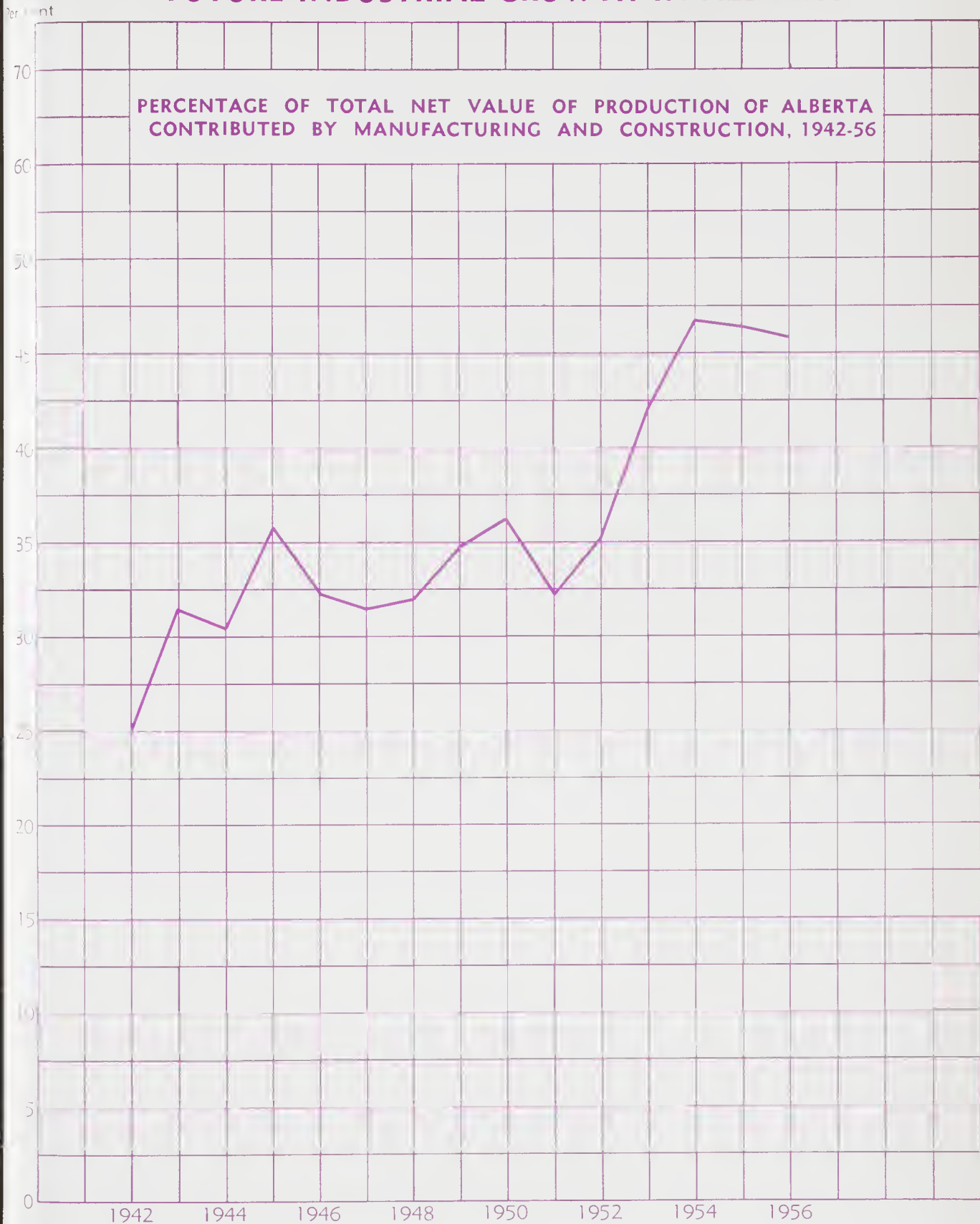


FUTURE INDUSTRIAL GROWTH IN ALBERTA



FUTURE INDUSTRIAL GROWTH IN ALBERTA

PERCENTAGE OF TOTAL NET VALUE OF PRODUCTION OF ALBERTA
CONTRIBUTED BY MANUFACTURING AND CONSTRUCTION, 1942-56



FUTURE INDUSTRIAL GROWTH IN ALBERTA

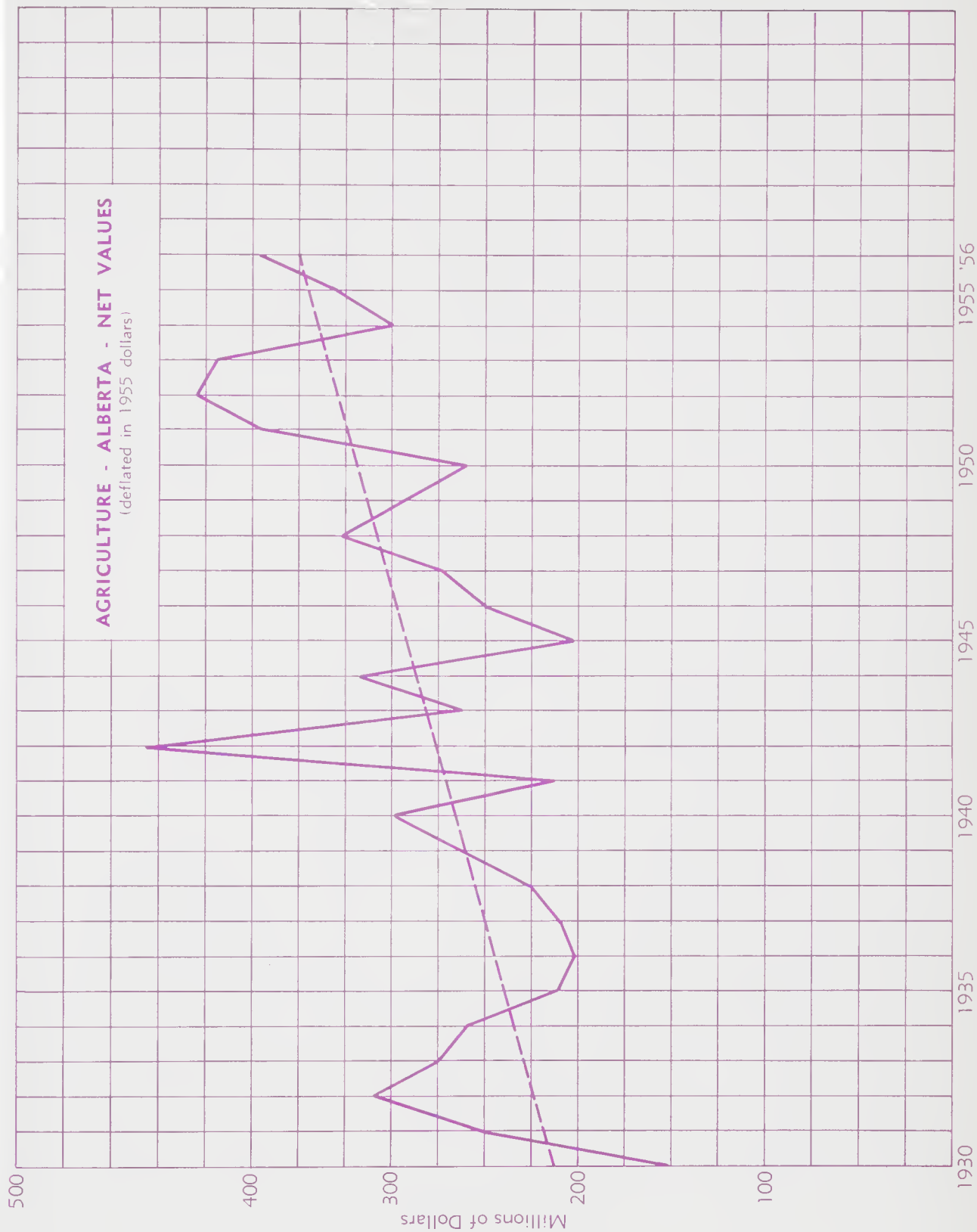


TABLE I

NET VALUE OF PRODUCTION IN ALBERTA

(thousands of dollars)

	Agriculture	Mining	Manufacturing	Construction	Forestry	Electric Power
1925	194,560	25,319	29,258			
1926	219,877	26,977	33,599			
1927	298,152	29,309	34,376			
1928	248,289	32,531	41,346			
1929	128,327	34,740	44,124			
1930	86,510	30,620	40,693			
1931	91,788	23,581	25,314			
1932	99,530	21,183	20,204			
1933	93,991	19,703	18,877			
1934	109,009	14,703	22,609			
1935	97,490	16,738	23,769			
1936	103,465	20,104	25,000			
1937	139,196	20,989	28,923			
1938	126,420	24,010	30,756	21,000	1,112	5,253
1939	119,450	24,959	32,618	25,000	1,414	5,543
1940	141,879	27,851	37,747	29,000	1,939	5,810
1941	109,601	34,129	45,958	40,000	2,287	6,323
1942	259,749	38,162	57,480	47,000	2,314	6,686
1943	186,755	39,661	65,797	45,000	2,478	7,726
1944	258,301	40,162	77,416	60,000	2,140	7,995
1945	179,091	41,713	78,548	53,000	2,907	8,227
1946	248,804	47,634	83,735	65,000	4,643	9,011
1947	286,080	54,960	89,290	74,000	4,537	9,708
1948	389,090	76,930	107,124	122,000	6,675	10,947
1949	349,455	106,806	114,681	140,000	5,862	11,961

TABLE I (Continued)

NET VALUE OF PRODUCTION IN ALBERTA (Thousands of Dollars)

	Agriculture	Mining	Manufacturing	Construction	Forestry	Electric Power
1950	322,320	122,542	123,893	142,000	7,204	13,863
1951	500,210	151,554	141,650	180,188	9,445	16,501
1952	481,649	171,119	178,221	195,622	10,831	19,502
1953	417,895	227,332	199,660	291,380	9,813	22,404
1954	301,616	257,385	219,328	302,898	8,613	25,602
1955	328,300	298,618	261,000	329,900	9,000	29,500
1956	397,200	373,000	292,000	399,000	9,000	35,000

NOTE: 1955 and 1956 figures are estimated since final figures were not available at time of publication.

TABLE II

FORECAST OF NET VALUE OF PRODUCTION IN ALBERTA

											1952 (millions of dollars)	1954	1975	Ratio 1975/1952
Agriculture	-	-	-	-	-	-	-	-	-	-	481.6	301.6	450	1.49
Construction	-	-	-	-	-	-	-	-	-	-	195.6	302.9	1,000	3.3
Manufacturing	-	-	-	-	-	-	-	-	-	-	178.2	219.3	800	3.7
Mining	-	-	-	-	-	-	-	-	-	-	171.1	257.4	1,600	5.3
Electric Power	-	-	-	-	-	-	-	-	-	-	19.5	25.6	120	4.7
Forestry	-	-	-	-	-	-	-	-	-	-	10.8	8.6	30	3.49
Other	-	-	-	-	-	-	-	-	-	-	2.4	1.7	3	1.76
Total	-	-	-	-	-	-	-	-	-	-	1,059.4	1,117.1	4,003	3.6
(percentage)														
Agriculture	-	-	-	-	-	-	-	-	-	-	45.5	27.0	11.2	
Construction	-	-	-	-	-	-	-	-	-	-	18.5	27.1	25.0	
Manufacturing	-	-	-	-	-	-	-	-	-	-	16.8	19.6	20.0	
Mining	-	-	-	-	-	-	-	-	-	-	16.1	23.0	40.0	
Electric Power	-	-	-	-	-	-	-	-	-	-	1.8	2.3	3.0	
Forestry	-	-	-	-	-	-	-	-	-	-	1.0	0.8	0.7	
Other	-	-	-	-	-	-	-	-	-	-	0.3	0.2	0.1	
Total	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	

CHAPTER VIII

RECOMMENDED INDUSTRIES FOR FUTURE EXPANSION IN ALBERTA

	Page
General Discussion	255
Foods and Beverages	255
Products of Petroleum and Coal	257
Wood Products	258
Iron and Steel Products	258
Non-Metallic Mineral Products	259
Chemicals and Allied Products	259
Transportation Equipment	260
Printing, Publishing and Allied Industries	261
Pulp and Paper Products	261
Clothing and Textiles	261
Non-Ferrous Metal Products	261
Electrical Apparatus and Supplies	262
Leather Products	262
Knitting Mills and Miscellaneous Industries	262

TABLES OF INFORMATION

Table 1 Consumption and Imports of Manufactured Goods 1954	256
--	-----

CHAPTER VIII

RECOMMENDED INDUSTRIES FOR FUTURE EXPANSION IN ALBERTA

GENERAL DISCUSSION

The present vigorous growth of Alberta's economy is expected to continue at least until 1975, the forecast period adopted in this report. The rate at which it will grow in these next few decades, however, and the extent to which growth will continue through the end of the present century depend to a major extent on the development of Alberta's manufacturing industries.

It is the purpose of this chapter to point out specific cases where opportunities for expansion and diversification of existing industries, and establishment of new industries, appear to exist. Recommendations have been restricted to the manufacturing industries, since it is this secondary type of expansion—after exploitation of natural resources has been carried to the greatest desirable extent—that shows the greatest potential for long-term continued economic progress.

Chapter V contains most of the data on which the recommendations of this section are based, and also contains forecasts of the growth of individual industries between 1955 and 1975. The forecast growth will occur only if private industry seizes upon the favourable expansion opportunities which exist in a broad range of manufacturing fields. It is the intention here to provide a guide which may assist in the initial location of some of

these opportunities.

Table I summarizes consumption and import values by industry groups in Alberta in 1954. The table is based on a study undertaken by the Alberta Bureau of Statistics in which 1946 and 1954 figures on production, imports and exports, and consumption were compared. On the basis of the study it would appear that consumption increased at a rate of between 3 and 4 per cent cumulative annually. This would mean that the 1957 figures would be from 10 to 15 per cent higher than the 1954 figures.

Referring again to Table I, the difference between the two figures in each case represents indicated production for domestic consumption only, and not total production which may include export sales.

It is not suggested that all present imports should be replaced by domestic production, on the contrary the discussion that follows will give specific examples of goods where an insufficient market in Western Canada, or international or regional division of production, would make the location of plants in Alberta uneconomical. Industries recommended for expansion are those in which production for local markets or for export appears to have a likelihood of economic success.

FOODS AND BEVERAGES

Although Alberta's Foods and Beverages industry group is a net exporter, annual imports of food products exceed \$60 million and were 29 per cent of consumption in 1954. Imports include specialty items which are not easily replaced by locally produced articles under a free economy; cheese imports, for instance, exceed the consumption of locally manufactured cheese in value, due to the demand within the province for foreign and Eastern Canadian varieties of cheese. Some of these, however, might well be produced in Alberta. Again, some \$5 million of canned fruit is imported annually, a substantial proportion of which consists

of types of fruit not grown in Alberta.

Expansion may, however, be expected in most industries of the Foods and Beverages group due to growing sales of established products. The products discussed in the following paragraphs appear to offer particularly good manufacturing opportunities.

Margarine is at present produced by only one manufacturer in Alberta, and 1957 imports stood at 7.8 million pounds valued at \$2.1 million. Rapeseed and other oilseeds are either grown in the province or may be grown there successfully, and

TABLE I

CONSUMPTION AND IMPORTS OF MANUFACTURED GOODS, ALBERTA, 1954

INDUSTRY GROUP	Consumption (millions of dollars)	Estimated Imports (millions of dollars)	Indicated Production* (millions of dollars)	Ratio of Production to Consumption (per cent)
Foods and Beverages - - - - -	218.7	64.2	154.5	71
Products of Petroleum and Coal - - - - -	88.5	3.4	85.1	96
Wood Products - - - - -	76.9	34.1	42.8	56
Iron and Steel Products - - - - -	141.1	122.5	18.6	13
Non-Metallic Mineral Products - - - - -	27.3	3.7	23.6	86
Chemicals and Allied Products - - - - -	34.0	30.0	4.0	12
Printing, Publishing and Allied Industries - - - - -	25.0	6.2	18.8	75
Paper Products - - - - -	20.2	13.9	6.3	31
Clothing - - - - -	52.9	47.8	5.1	10
Textiles - - - - -	13.7	11.5	2.2	16
Non-Ferrous Metal Products - - - - -	3.9	3.5	.4	10
Electrical Apparatus and Supplies - - - - -	4.3	4.2	.1	2
Leather Products - - - - -	12.4	12.2	.2	2
Tobacco Products - - - - -	20.2	20.2	-	-
Rubber Products - - - - -	19.3	19.3	-	-
Miscellaneous Industries - - - - -	9.3	9.2	.1	1

* For domestic consumption only.

increased production of margarine would seem justified.

Jelly powders are not produced in Alberta. Animal raw products are abundant for the production of table jelly, probably in conjunction with gelatin for industrial use and glue.

Prepared mustard is not manufactured in Alberta or Saskatchewan, although Lethbridge is the world's most important mustard producing centre. In addition to manufacturing for consumption in the area, the development of mustard specialties for export is recommended.

Distilled liquors are presently produced at one plant in Calgary which markets whiskey, gin, rum, and vodka. Consumption of spirits in 1956 amounted to 899,000 gallons valued at \$26 million. A major grain and sugar producing region like Alberta offers advantages to distillers and this industry is recommended for expansion. Freight rates on spirits, being low in proportion to the price of the end product, are not a handicap to the export opportunities of this industry.

Canned vegetables are produced by three firms in southern Alberta, and one of these also markets frozen vegetables. There appears to be room for further expansion in this field in which present exports approach 50 per cent of production. New manufacturers suggested are vegetable juices, strained foods for infants, canned soups and sandwich pastes.

Manufacture is also recommended of ready ("television") dinners, mayonnaise and salad dressings.

Synthetic sausage casing and eviscerated poultry casing manufacture should be considered. Alberta in 1956 consumed \$412,000 compared to a total consumption for British Columbia, Saskat-

chewan and Manitoba of \$578,000. The 1956 estimated consumption of eviscerated poultry casing is 3,500,000 bags.

There are only two manufacturers of breakfast food in Alberta. The province has an estimated 1956 consumption of over \$2 million and apparently produces less than \$150,000 a year.

Alberta has only one plant producing canned milk. There appears to be milk available for a 100,000 pounds a day raw milk processing plant in the province. Such a plant would increase farmers' cash income and not interfere with existing facilities.

There should be increasing demands for prepared stock and poultry feeds. Recent data on stock populations are as follows:

	Population June 1, 1956	Marketed in 1956
Beef - -	2,186,000 head	717,100 head
Swine - -	1,455,000 head	1,598,900 head
Poultry - -	2,950,000 birds	17,981,000 pounds
Turkey - -	715,000 birds	9,176,000 pounds
Sheep - -	455,000 head	145,380 head

Cake and dough mixes should have a good market, with a prairie population of three million, expected to rise to four million. Raw materials are produced locally.

Candy manufacturers should expand. The western prairie population is now large enough to justify local production of chocolate bars and other candies.

There is no producer of potato starch and flour in Alberta, and manufacture of these products is considered worthy of investigation.

PRODUCTS OF PETROLEUM AND COAL

Alberta is practically self-sufficient in all products of petroleum and coal, of which she is also a large exporter. The establishment of further petroleum refineries, absorption gasoline plants and gas desulphurization plants is assumed in the earlier forecast of growth of this industry. (Chapter V).

Of the remaining minor industries' additional coke production may be undertaken if a steel mill is built in the Crowsnest area. Sales of asphalt compounds are advancing and asphalt tile could be made. The possibilities of manufacturing carbon black, artificial graphite, and carbon explosives should be examined.

WOOD PRODUCTS

Of \$34 million of imports in 1954, furniture accounted for \$12 million, sawmill products for \$7 million, plywood for \$6 million and hardwood flooring for \$4 million. The position regarding plywood has since been altered by the construction of several plywood plants. Imported sawmill products and hardwood flooring are for the most part made of woods not available in Alberta.

Alberta's manufacture of upholstered furniture in 1956 amounted to only \$2 million, and there should be scope for additional large-scale plants manufacturing facilities for this type of furniture. Plywood furniture manufacture is now recommended in view of the recent expansion of the plywood industry in the province. This starting pro-

duct is also used in boxes, building panels and prefabricated dwellings, and it is suggested that the province can sustain at least one new plant in each of these industries. Plywood articles are sufficiently light to make shipment to other provinces economical.

The development of the primary plastics industry suggests expansion of the manufacture of kitchen and living room furniture with plastic table tops and plastic seat covering. Diversification of plastics manufacture is recommended below under Chemicals and Allied Products, and it is expected that plastics suitable for laminated table tops and for seat covering will be manufactured in Alberta during the present decade.

IRON AND STEEL PRODUCTS

This industry group has the largest import value of any manufacturing group. Of \$123 million of imports in 1954, \$42 million were industrial machinery, \$32 million agricultural implements and \$21 million structural steel. Altogether 87 per cent of iron and steel products consumed in the province were imported from other provinces or the United States. This ratio will not have altered materially since 1954 as production from a new steel rolling mill and two pipe mills will be offset by substantially increased demands by the construction industry. Total imports from foreign countries alone were \$174 million for 1956.

More than half of the value of the major import item, industrial machinery, in 1954 was oil well drilling, maintenance and testing machinery. Much of it imported duty free from the United States. During 1956, \$73 million of oil field equipment was imported into Western Canada. Some of this equipment could be manufactured in Alberta.

Mining machinery for Alberta's coal mines and for metal mining along the northern waterways was imported from the United States in 1956 to the value of \$2,670,000, heavy construction machinery including bull dozers, power shovels, \$13.1 million, air and gas compressing machinery for \$1 million. There is a strong case for more production within the province of buckets' teeth, liners and other steel alloy parts for excavating and mining machinery. This would require local steel foundries and manufacturers to work very closely together. The manufacture of light industrial equipment such as lifting equipment is also recommended.

Import figures indicates the opportunity for the construction of more steel mill capacity in Alberta. As stated in the chapter on Manufacturing, the construction of a mill producing pig iron and steel from iron ore deposits is now under consideration. The customs duty on United States structural steel is \$3 or \$7 per ton, according to the specifications of the steel imported.

Of \$32 million of agricultural machinery imported in 1954, the following items came from the United States:

Item	1954 Amount (Dollars)	1956 Amount (Dollars)
Traction Engines - - - - -	8,867,000	16,904,516
Traction Engine Parts - - - - -	3,049,000	5,632,228
Combine harvesters and parts - - - - -	1,679,000	2,102,529
Ploughs and parts - - - - -	691,000	456,209
Cultivators, horse hoes, weeders, scufflers, and parts - - - - -	526,000	762,285
Hay presses and parts - - - - -	420,000	2,006,072
	<hr/> 15,232,000	<hr/> 40,998,516

There is no duty on most agricultural implements. As the United States admits Canadian-made products free of duty, the market open to a Canadian manufacturer in the predominantly agricultural Prairie Provinces and Mountain States is substantial. It is therefore recommended that more farming machinery be made in Alberta. There is scope from items ranging from milking machinery to power rakes, and present manufactures in Alberta have proved that the agricultural machinery can be profitably produced in the province.

Boilers and platework, although dutiable at 20 per cent, were imported in 1956 to the extent of \$6.1 million from the United States. A further million dollars' worth was brought in from Eastern Canada, and there appears to be a strong case again here for recommending the manufacture of these and other sheet metal products, from heat ex-

changers and steel drums to bottle caps, in Alberta.

Air conditioning apparatus, radiators, cooking stoves, water heaters and furnaces represent substantial import values, and the establishment of manufacturers in Alberta for these commodities is also recommended.

Three million dollars' worth of hardware, tools and cutlery was imported from the United States in 1954—consumption in the province in 1957 probably exceeded \$8 million compared to less than \$500,000 of production. Manufacturing plants for table cutlery, scissors, clasp knives, hand implements such as axes, spades and shovels, rock drill bits and electric hand tools, pole line hardware, valves, welding electrodes, fencing, and bathtubs are strongly recommended for investigation. It may be noted that there is no forging plant in Canada west of the Great Lakes.

NON-METALLIC MINERAL PRODUCTS

Imports of Non-Metallic Mineral Products are small, Alberta is a net exporter of this range of products.

In the chapter on Manufacturing a higher growth rate is predicted for this industry group than for any other group already well established in Alberta. It is envisaged that new producers will

become established in all branches of the group. Possible new industries for study are: sandpaper manufacture, linoleum, electric light bulbs, fibre glass products, glass for windows, rockwool manufacture, porcelain bathroom fixtures, electric insulators, pumice products, and enamelling of steel bathroom fixtures.

CHEMICALS AND ALLIED PRODUCTS

The earlier discussion of the chemical industry in Alberta led to the conclusion that chemicals with

a tonnage price below \$100 could be, and were, manufactured (where a local market existed) with-

out fear of competition from producers outside the province. Products priced above \$600 per ton, if based on local resources, tended to be manufactured economically enough to enable absorption of freight penalties to Eastern Canada and world markets. In the case of products not at the extremes of the price scale the Albertan producer would find difficulties in absorbing freight differentials to market outside Western Canada, and was open in his home territory to outside competition by manufacturers in Eastern Canada. The latter would often absorb freight differentials in order to increase their Canadian sales totals to a level at which greater production economies would be achieved. Modifying this were two considerations—one, that an eventual shortage of the light hydrocarbons in Eastern Canada might reduce competition to an Albertan producer of medium-priced petrochemicals based on these fractions; and two, that in certain medium-priced products the western market might be large enough to enable its manufacture as economically as by large-scale producers in Ontario or Quebec.

Chemicals recommended for production accordingly fall under one of the two following categories:

- (a) Market-orientated products. Requirements are a sufficiently large Western Canadian market to support economical production, and a unit price sufficiently low to ensure immunity from competition from outside the region on account of high freight penalties in proportion to the value of the merchandise.
- (b) Resources-orientated products. Requirements are economies due to low-cost raw products, sufficient to compensate for freight differential; only a product with a relatively high unit price is likely to fulfill this condition.

Basic chemicals of low unit price now made in Alberta include sulphuric, and muriatic acids caustic soda, chlorine, and formaldehyde. Others, like caustic potash, soda ash, and hydrogen peroxide are imported. The factors involved in chem-

ical production are too complex to recommend outright the manufacture of specific further products. However, investigation of manufacturing possibilities of all basic chemicals apart from those already made in Alberta is recommended.

The strongest case exists for recommending the manufacture now of high-priced synthetic chemicals whose manufacture is based on starting products available in the province, including those from present chemical production. Natural resources used for chemicals manufacture include natural gas, liquid petroleum gases, petroleum, gas streams from petroleum refineries, hydrogen sulphide, salt, limestone, water and coal.

Regions of Canada closer to the main domestic markets and to tidewater will tend to have the same advantages in manufacturing coal chemicals as Alberta. Output of such chemicals would depend in any case, on coke production geared to the production of the furnaces of the steel industry which so far is still in the planning stages as far as Alberta is concerned.

The Albertan chemical manufacturer is likely to derive greater advantages over his competitors elsewhere in Canada by utilizing natural gas, oil, and petroleum, which are now available in large quantities and at low cost. The technological aspects of petrochemical production are outside the scope of this paper. As manufacturing units in this field are generally large-scale operations, their profitability would in any case be determined by detailed production and market studies. End products in the higher price range include plastics intermediates, resins, films, adhesives, coatings and fibres.

The further manufacture of chemical products for direct consumption—paints and varnishes, ethanolamines, glycols, ammonium, various types of adhesives, and agricultural chemicals such as insecticides and herbicides—may be justified as the population of Western Canada continues to increase. Again, a detailed study would be necessary in each case.

TRANSPORTATION EQUIPMENT

Industries recommended are aircraft parts, not yet produced at airports other than Edmonton,

trailers, fire engines, motor vehicle parts and accessories. While the main development of this indus-

ty is predicted to come from the railway workshops, there appears to be a great deal of scope for private enterprise in the industries mentioned.

The establishment of forging facilities in Alberta would greatly assist the manufacture of items and parts of transportation equipment.

PRINTING, PUBLISHING, AND ALLIED INDUSTRIES

All branches of the printing trades offer opportunities for expansion. Commercial printing and lithographing will probably expand at a greater

rate than printing and publishing due to the demands by new industries.

PULP AND PAPER PRODUCTS

The economics of the new pulp mill at Hinton point to outstanding opportunities in this field. The construction of additional pulp or newsprint mills each with an annual sales figure of \$20 million has been predicted for the period through 1975. Plants becoming established in the near future are likely to benefit from the prevailing favourable official attitude regarding long-term contracts for timber rights and stumpage prices.

The operation of pulp mills in the province also provides a basis for paper manufacture. An estimated \$11 million worth of paper was imported

into Alberta in 1954—the 1957 figure is probably in the vicinity of \$14 million. Cardboard, wrapping paper, and writing paper manufactured in the province should find a sufficient market locally, and in the other Prairie Provinces to support several paper mills. Paper bags are so far made only by one firm, and with an estimated consumption of \$3 million in 1957, there should be sufficient scope for one or two additional manufacturers. Other products which might be considered are multiwall bags, fibre board, cleansing tissues, paper towels, and paper napkins.

CLOTHING

The Clothing industry of Alberta in 1956 produces only some \$8.4 million worth of garments, compared to imports totalling some \$40 million. Women's and children's garments accounted for almost half this latter amount, men's clothing for \$14 million, and fur goods for \$3 million.

There appear to be opportunities for expansion in all of the industries represented in this group.

Additionally, the following clothing trades which are not yet established in the province offer scope to new manufacturers:

- Women's coats and suits
- Lingerie
- Gloves and mittens (fabric)
- Waterproof clothing
- Women's and men's hose.

TEXTILES

Textile industries not yet operating in the province which are recommended to potential manufacturers include:

- Cordage, Rope and Twine
- Carpets, Mats, and Rugs

Although statistics are not available for consumption of these products, it is believed that the local market could sustain at least one firm at present in each of these trades. Cellulose Acetate yarn is made by Canadian Chemical Company at Edmonton.

NON-FERROUS METAL PRODUCTS

The establishment of further non-ferrous metal smelters is envisaged, and is discussed in the chapter on Manufacturing. Products that

deserve study are plumbers' supplies, wire and electroplating.

ELECTRICAL APPARATUS AND SUPPLIES

Various branches of this industry group are believed to offer good prospects. Generators, telecommunication equipment including radio receivers, household appliances and electrical accessories are imported both from other parts of Canada and from the United States. The market in the prairies and British Columbia for numerous

items in these categories could be sufficient to make their manufacture in Alberta worthwhile, especially by experienced manufacturers already established elsewhere in North America. Also to be considered are the following: dry batteries, meter transformers, panel boards, switch gear, time switches and television picture tube rebuilding.

LEATHER PRODUCTS

Alberta raw materials should provide an excellent basis for Leather Products industries. A new tannery went into operation at Edmonton in 1957, and it is believed that the primary

leather industry offers scope to further produce. The manufacture of many leather consumer products becomes worthy of consideration with leather now available locally.

KNITTING MILLS

This is an industry group in which are no strong indications of openings for further production, although it is possible these may exist. The

knitting mills at present in Alberta are likely to satisfy the local demand for some time.

MISCELLANEOUS INDUSTRIES

Of the industries included in the classification "Miscellaneous Industries", one of the most promising is considered to be Plastic Products.

Such products, based on plastic resins made in Alberta should enjoy markets from Vancouver to Winnipeg. With the expansion of resin manufacture, new plastics producers are offered production opportunities not yet exploited.

Rubber products include tire retreading, and the establishment of retreading works in the major cities of the province is strongly recommended. Manufacture of rubber products for oil field equipment has just started. Manufacture of storage battery boxes to supply Calgary battery manufacturers might be investigated.

CHAPTER IX

SITES FOR INDUSTRY: THE CITIES OF ALBERTA

	Page
Calgary:	
Transportation Facilities	265
Population	266
Labour Force	266
Climate	266
Geography	266
Water Supply	275
Fuel and Power	275
Taxation	277
Industrial Development	277
Amenities	277
Shopping Centres	278
Industrial Districts	278
Camrose	279
Drumheller	281
Edmonton:	
Transportation Facilities	283
Population	284
Labour Force	285
Climate	285
Geography	285
Water Supply	285
Fuel and Power	286
Taxation	287
Industrial Development	287
Amenities	288
Shopping Centres	288
Industrial Districts	288
Grande Prairie	289
Lethbridge:	
Transportation Facilities	291
Population	292
Labour Force	292
Climate	292
Geography	292
Water Supply	292
Fuel and Power	293
Taxation	293
Industrial Development	293
Amenities	294
Shopping Centres	295

Medicine Hat:

Transportation Facilities	295
Population	295
Labour Force	295
Climate	295
Geography	296
Water Supply	296
Fuel and Power	296
Taxation	297
Industrial Development	297
Amenities	297
Red Deer	298
Wetaskiwin	299

CHARTS AND MAPS

Typical Localities in Alberta	307
Railways in Alberta	309
January Average Maximum Temperatures	311
July Average Maximum Temperatures	313

CHAPTER IX

SITES FOR INDUSTRY: THE CITIES OF ALBERTA

The cities of Alberta have been selected for survey here as a representative sampling of possible industrial sites in different parts of the province. Space limitations prevent inclusion of all Alberta centres which offer favourable locations for industry, and it must be understood that Alberta cities by no means exhaust the possible sites for future industrial development in the province. Information on any locality in Alberta may be obtained by writing the Director of Industrial Development of Calgary Power Ltd.*

The sketch map in the chapter shows railroads in Alberta in relation to the centres surveyed. Road haulage services are outlined in each survey and Chapter III. Commodity rates and other details are contained in the "Alberta Shipper's Guide" obtainable from the Alberta Motor Transport Association of Edmonton and Calgary.

Population figures given are for census years, as published by the Dominion Bureau of Statistics. Details of the extent and population of a centre's

trading area have in most cases been supplied by local authorities. The Employment Service of the Unemployment Insurance Commission** can supply information on the labour supply in various localities within the province.

The assessment of real property in the cities of the province is governed by The City Act. Taxable property comprises land, buildings, structures and fixtures. The term "fixtures" includes servicing equipment forming a permanent part of the building, as well as processing equipment and machinery affixed to the premises. The base year of assessment is 1944-45 in Edmonton and Calgary, and 1942 in all other municipalities. The tax base is 100 per cent of assessed value, except for buildings and improvements in cities other than Camrose. These cities have provided by permissive by-laws that a sum equal to 60 per cent of the fair actual value of building and improvements shall be entered on the assessment roll for taxation purposes. Edmonton uses a special rate of 50 per cent as a tax base for residential buildings.

CALGARY

Transportation Facilities

The City of Calgary lies at the confluence of the Bow and Elbow Rivers. The city is served by the main transcontinental line of the Canadian Pacific Railway and is the terminal for Canadian Pacific services to Edmonton, Lethbridge, the Crowsnest Pass, and Drumheller. It is also the terminal for the Canadian National Railways lines from Saskatoon via Kindersley and Rosetown, Saskatchewan, from Edmonton via Three Hills, and from Edmonton via Drumheller and Stettler.

The Trans-Canada Highway passes through Calgary, linking it with Vancouver in the west and Regina and Winnipeg in the east. Highway No. 2 links Calgary to Edmonton and the Alaska Highway in the north, and to Fort Macleod and the

United States in the south. Road distances from Calgary to selected localities are:

	Miles
Vancouver, British Columbia	799
Banff, Alberta	85
Edmonton, Alberta	189
Saskatoon, Saskatchewan	426
Regina, Saskatchewan	515
Winnipeg, Manitoba	912
International Border	148
Havre, Montana	331
Spokane, Washington	445

The following scheduled flights operate from the city-owned Calgary Airport which has a privately-owned repair shop:

* Please address Director of Industrial Development, Calgary Power Ltd., 140 - First Avenue West, Calgary, Alberta, Canada.

** Employment Service, Unemployment Insurance Commission, Traders Building, Calgary, Alberta, or 10019 - 101A Avenue, Edmonton, Alberta.

Trans-Canada Air Lines: Transeontinental flights both east and westbound, tourist and first class. Several flights daily to Edmonton, to Lethbridge (with connection to all western United States Points), and to Medicine Hat.

Canadian Pacific Air Lines: Daily service to Vancouver, with stops at Cranbrook, Castlegar and Penticton.

There is a bus depot from which long distance buses operate to numerous places in Alberta, Saskatchewan, British Columbia, Montana, Idaho, and other United States points. The city transit system operates trolley and gasoline buses. There are ten licensed truck depots in the city which offer haulage facilities to numerous destinations in Canada, Alaska and the United States.

Population

The population of metropolitan Calgary in recent census years has been as follows:

Year	City	Bowness	Forest Lawn	Montgomery*	Parts of Municipalities 31 and 44**	Total Metropolitan Area
1946 - -	100,044	650	646	—	—	101,340
1951 - -	129,060	2,922	1,079	1,390	6,194	140,645
1956 - -	181,780	6,217	3,150	4,650	4,652	200,449
1957 - -	192,577	—	—	—	—	220,000 (Est)

* Includes No. 46 Improvement District.

** Foothills and Rocky View.

The city's trading area extends from Red Deer to the United States border, and from the Saskatchewan border to Nelson and Trail in south-eastern British Columbia. The trading area population comprises some 500,000 people of which 294,000 reside within 100 miles of Calgary.

The population of Calgary now ranks ninth among Canadian metropolitan areas. Its proportionate population growth at the rate of 42.5 per cent between the census years 1951 and 1956 has been more rapid than that of any metropolitan area in Canada outside Alberta.

Labour Force

A labour force of 81,300 was reported for September, 1957.

Climate

The altitude of Calgary is 3,439 feet—nearly three-quarters of a mile above sea level. The out-

standing features of the climate are moderate rainfall, dry air, moderately cold winters, and light snowfall. Summer temperatures are warm and pleasant. Spring-like weather occurs at times in the winter when the dry westerly Chinook blows from the Pacific, raising the temperature rapidly.

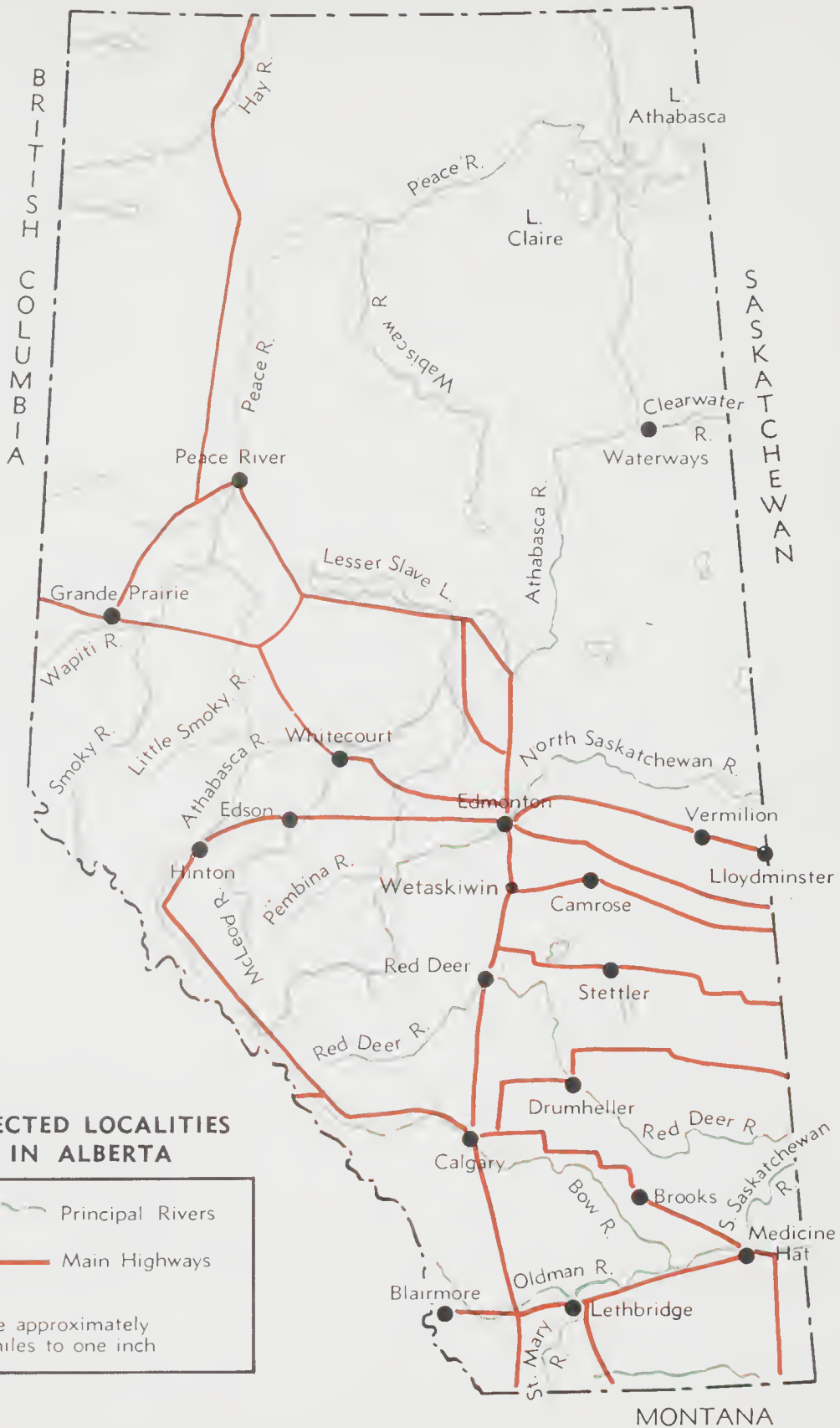
The altitude of Calgary, which is higher than that of any other major Canadian city, gives the city an exhilarating quality. The weather is generally sunny; the annual average is 2,245 hours of sunshine, as compared to 2,048 and 1,803 hours respectively at Toronto and Montreal.

Geography

Calgary lies at the confluence of two swiftly flowing rivers, the Bow and the Elbow, at the eastern edge of the foothills of the Rockies. The Bow valley is the main entrance into the Banff National Park, renowned for its scenery.

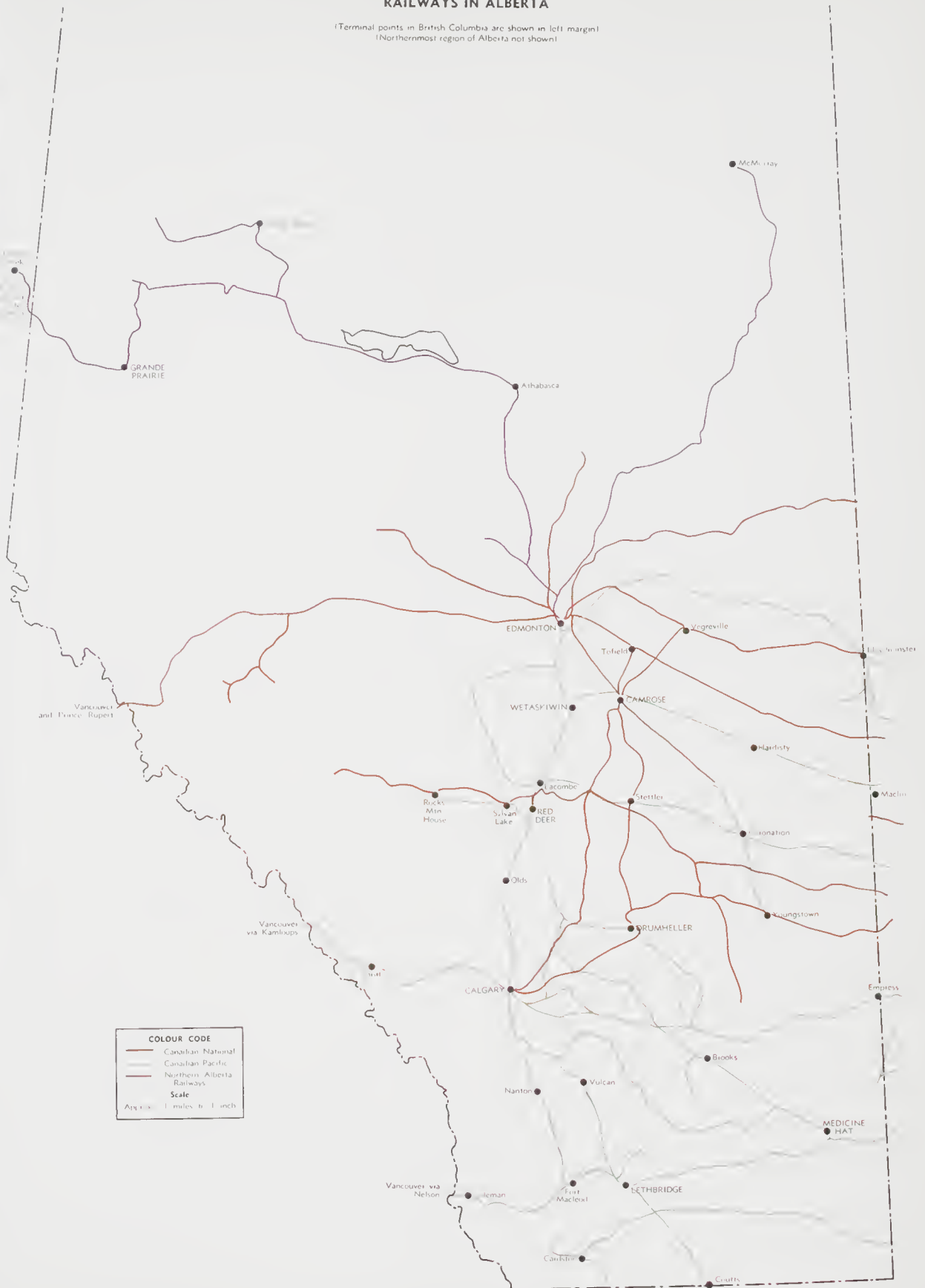
Geologically, the glacial mantle of the Calgary

NORTHWEST TERRITORIES

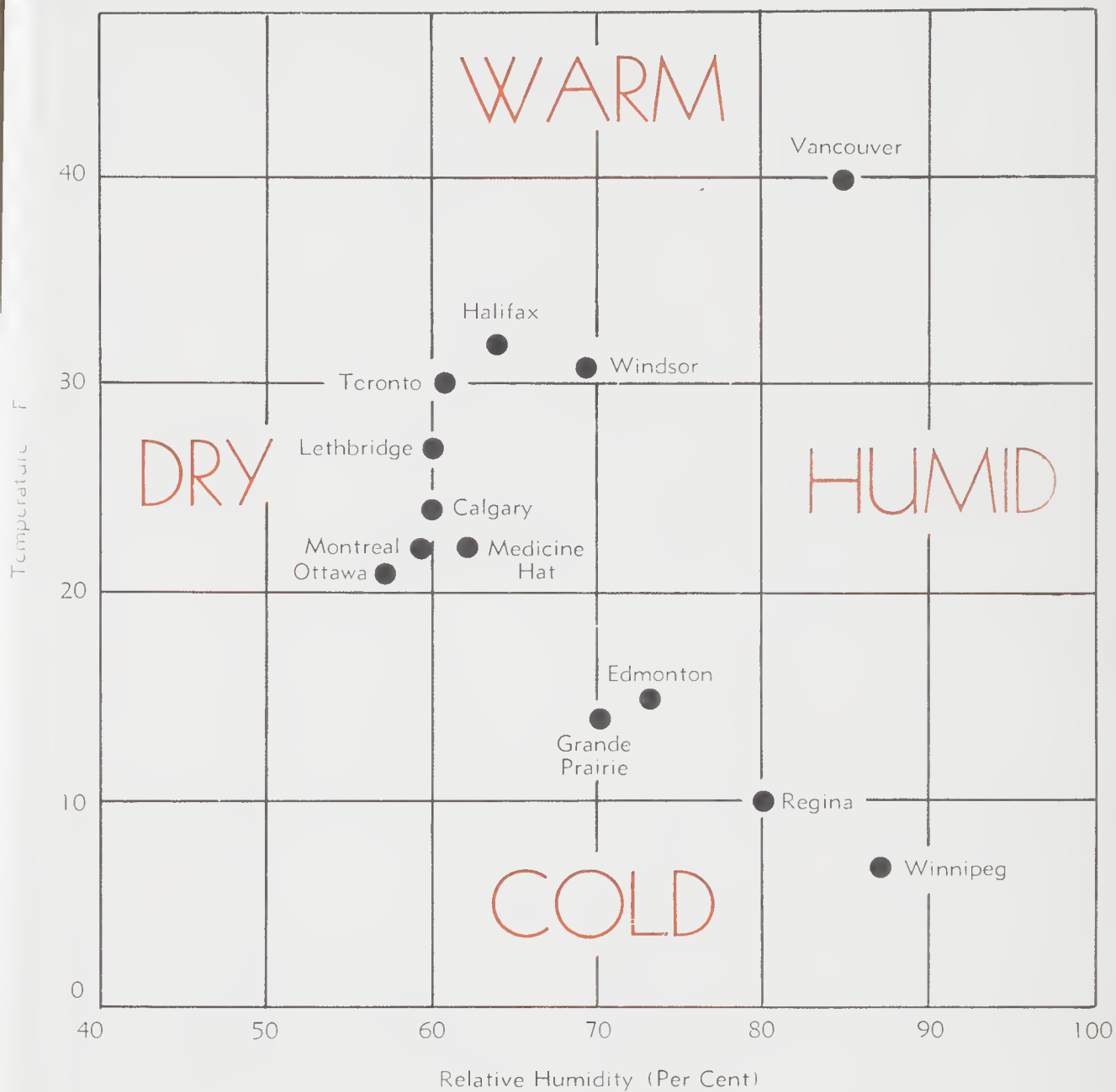


RAILWAYS IN ALBERTA

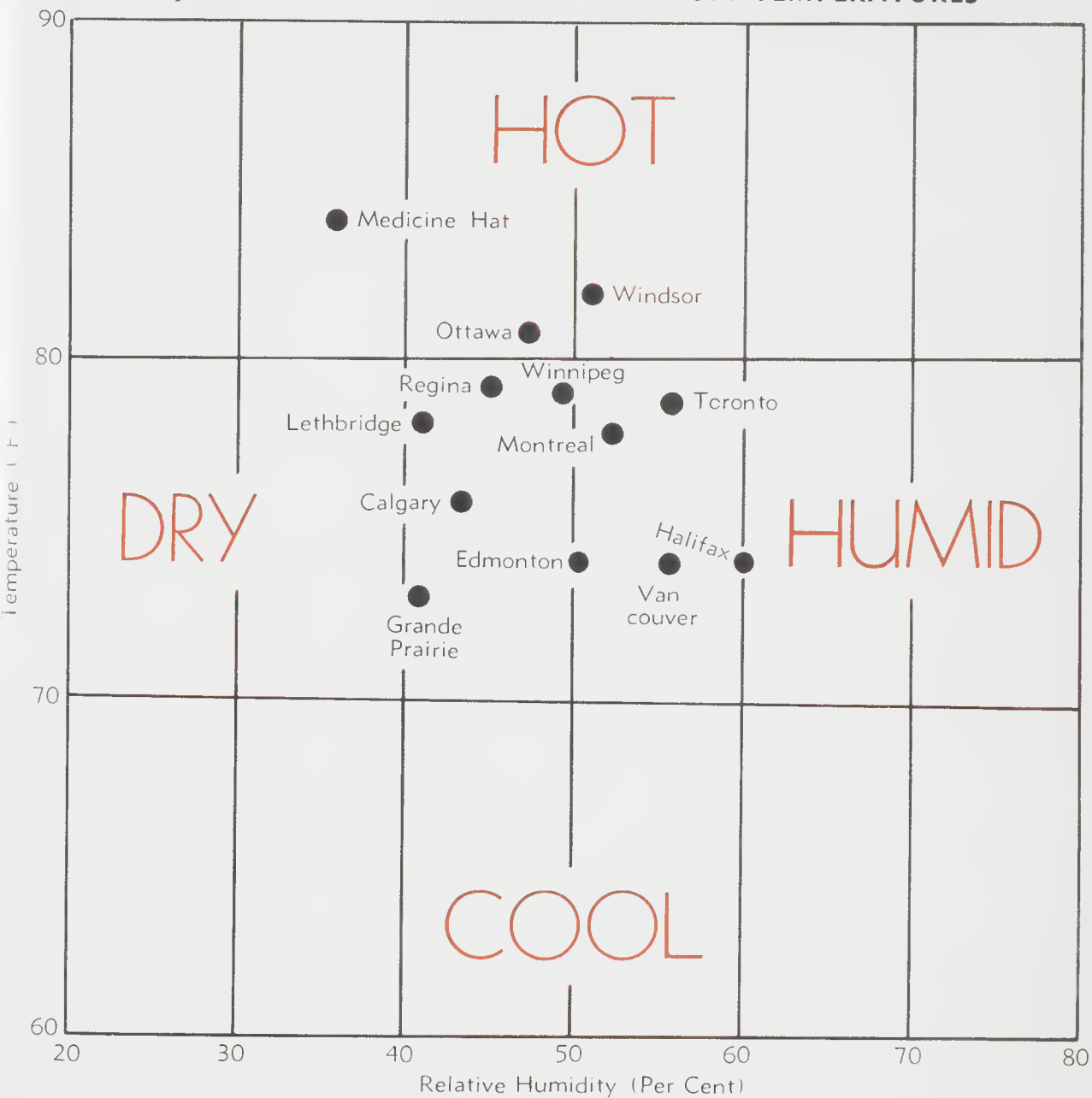
(Terminal points in British Columbia are shown in left margin)
(Northernmost region of Alberta not shown)



JANUARY AVERAGE EFFECTIVE MAXIMUM TEMPERATURES



JULY AVERAGE EFFECTIVE MAXIMUM TEMPERATURES



district is underlain by the Paskapoo formation which consists of a series of hard, dun-coloured sandstones, soft greenish sandstones, and shales. Paskapoo sandstone has been used in the Alberta Legislature Building and other structures.

The city lies in the Thin Black Soil zone; 25 miles east of the city is the Dark Brown Soil zone and 11 miles west is the Black Soil zone. Thin black soils have a fairly high nitrogen and organic matter content. The natural vegetation is grass-land, with bluffs of trees in places where moisture conditions are favourable. The principal crop is wheat, but diversification is practised and helps to maintain soil fertility. The non-arable land is good pasture, and just east of the city, farms range from one to thirteen sections (one section equals 640 acres or one square mile).

Water Supply

The Calgary water works and distribution system are owned by the city. Numerous industrial plants have their own water wells, using the city service as a stand-by. The municipal supplies come from the Glenmore Dam on the Elbow River, from which water is fed to a purification plant and a clear water basin. Distribution is by gravity or pumps, according to the location of the users. Private wells draw on a large undiminishing underground water-bearing stratum, within 50 feet of the surface. Some individual firms drawing in excess of one million gallons per day.

Domestic flat rates are scaled according to the number of rooms in the house. Commercial and industrial metered supplies are charged at the following rates:

Gallons	Per M.I.G. Cents	Monthly Charge
0— 5,000	44	2.20 (minimum)
5,001— 10,000	40	4.20 (maximum)
10,001— 30,000	36	11.40 (maximum)
30,001— 60,000	29	20.10 (maximum)
60,001—150,000	20	38.10 (maximum)
150,001—500,000	18	101.10 (maximum)
500,001—and up	15	

These rates are subject to five per cent discount on payment of accounts within ten days of rendition. From May through September, special garden rates are available for residences requesting water meters.

Fuel and Power

ELECTRICITY: Electricity is purchased wholesale by the city from Calgary Power Ltd. and is retailed by the city's Electric Light Department. Industrial rates are shown on the following pages.

POWER RATES UNDER 100 K.V.A.

(230 V. 3-Phase 3-Wire)

	City Rate	Suburban Rate
First 30 K.W.H. per H.P. - - - - -	2c per K.W.H.	2.5c per K.W.H.
Next 30 K.W.H. per H.P. - - - - -	1.6c per K.W.H.	2c per K.W.H.
All over 60 K.W.H. per H.P. - - - - -	1.2c per K.W.H.	1.5c per K.W.H.

Minimum Charge

First 50 H.P. of Connected Load \$1.00 per H.P.; Suburban \$1.50 per H.P.
 All over 50 H.P. - 75c per H.P. Not less than 3 H.P.

POWER RATES

Wholesale Light and Power Rates (over 100 K.V.A. Demand) where Power Demand equals Light Demand, first 300 K.W.H. at five cents—next 300 K.W.H. at four cents. After 600 K.W.H. used, the following Demand Rates apply per K.V.A. of Demand:

Rate Per K.W.H.				Customer Owning Transformers Etc. Voltage of Service			City Owning Transformers Etc. Voltage of Service			
City	Rural			13200 V	4160 V	220/440 V	13200 V*	4160 V	220/440 V	
(cents)										
1.3	1.5	First	-	Number of Hours	25	40	125	25	90	200
1.2	1.4	Next	-		25	40	125	25	90	200
1.1	1.3	Next	-		25	40	125	25	90	200
1.0	1.2	Over	-		75	120	375	75	270	600

Discount: Five per cent ten days up to \$3,000. 10 per cent ten days \$3,000 and over.

* Rental charged at one per cent per month of Transformer Value.

City Minimum Charge:

75 cents per K.V.A. of demand taken as the highest 10 minute peak during the months October to March inclusive.

Not less than 40 per cent of total Connected Load. Minimum charge \$75.00 per month.

Suburban:

\$1.20 per K.V.A. Minimum charge \$120.00 per month.

NATURAL GAS: Natural gas is supplied and distributed by the Canadian Western Natural Gas Company Limited, from the Jumping Pound field, 30 miles west, and the Turner Valley field, 38 miles southwest of the city. Rates are sealed as follows:

General Rates*

First 2 MCF or less \$2.50 per month

All additional MCF \$0.26 per MCF per month

Commercial and Industrial Rates (For customers using in excess of 9,906 MCF per year).

(i) Customers whose annual consumption is greater than 9,906 MCF per year and less than 34,000 MCF per year—Fixed charge \$35.00 per month plus commodity charge of 22c per MCF; minimum monthly charge \$35.00.

(ii) Customers whose annual consumption is greater than 34,000 MCF per year—Fixed

charge \$120.00 per month plus commodity charge of 19c per MCF; minimum monthly charge \$120.00.

Optional High Load Factor Rate (For customers on annual contract whose annual consumption of gas is not less than 12,000 MCF).

Fixed Charge—

\$20.00 per month plus

\$ 1.00 per month per 1,000 cubic feet of maximum 12-hour demand.

Commodity Charge—

First 2,000 MCF per month 19c per MCF

Next 2,000 MCF per month 16c per MCF

Next 150,000 MCF per month 14c per MCF

All additional MCF per month 13.5c per MCF

Minimum monthly charge—the fixed charge, as above.

* Details as to demand charges and terms of contract can be obtained from "The Canadian Western Natural Gas Co. Ltd., 6th Avenue and 1st Street S.W., Calgary."

Taxation

The 1957 mill rate stood at 47. There is also a business assessment—currently ten per cent of gross rental value. City licences must be obtained by certain establishments which are supervised by City Health, Police, Fire, and Building Departments.

Industrial Development

Calgary is at once the centre of a rich agricultural area and the headquarters city for Canada's oil industry. In addition to manufacturing industries, based on farm, ranch, and mineral products, light industries, warehouses, and service industries have concentrated in the city.

Apart from locally produced raw materials, Calgary has other advantages as a site for industrial undertakings: low cost electric power; low cost gas; abundance of pure water; good transportation facilities; availability of labour; good living conditions; availability of planned industrial sites.

Two new industrial parks, Highfield and Manchester in the southeast of the city, offer road, rail, water, sewer, and power services. Other industrial sections have been planned nearby.

More than \$1 million was spent by the city on industrial development during 1954-55. Railway companies and private firms co-operated in this development, and details of areas and facilities created are described in this section. The report submitted in January, 1956, by the Royal Commission on the Metropolitan Development of Calgary and Edmonton contains recommendations for the substantial extension of the city boundaries to include the fringe towns of Bowness and Forest Lawn, the hamlet of Montgomery, and portions of land on all sides except to the north.

Existing large manufacturing units include: two oil refineries, two chemical plants making explosives and fertilizers respectively, a railway maintenance workshop, storage battery plants, a concrete precasting plant, a steel products plant, and sawmills. A new cast iron pipe plant costing \$2 million was brought into operation in the autumn of 1957. Major food processing industries include five flour mills, four meat packing plants, poultry and dairy product plants.

Distributive and service industries are well represented. About 360 oil and gas companies maintain offices in the city, and some 200 service and supply companies specializing in oil and gas equipment operate out of Calgary. In addition, 46 drilling contractors have offices in the city.

Additional information on industrial development can be obtained from "The Co-ordinator of Industrial Development", City Hall, Calgary.

Amenities

There are 68 public schools—three senior high, 15 junior high, and 50 elementary schools. In addition, there are 19 separate schools—two senior high and 17 elementary schools. The Provincial Institute of Technology and Art offers a variety of courses in technical subjects, arts and crafts, apprentice training, and evening courses. The Mount Royal College, a junior college affiliated to the University of Alberta, offers training to first and second year engineering students, business and secretarial courses, a conservatory of music, and an evening college. The University of Alberta maintains a Calgary branch which conducts a one year's teachers course, a first and second year course leading to the degree of Bachelor of Education, and the first three years of the course leading to the degree of Bachelor of Education in Industrial Arts. It also provides the first year course of Commerce, Arts and Science which is prerequisite to admission to certain faculties, and the first year course leading to the degree of Bachelor of Science in Nursing. A new location for the Calgary Branch of the University has been chosen. Building is to start in 1959. There is a public library with four branches, a technical reference section, and one bookmobile. The Calgary Allied Arts Council headquartered at Coste House, conducts a number of cultural clubs and societies.

Medical facilities are excellent. As well as a tuberculosis sanatorium situated eight miles west of the city, there are 2,491 hospital beds in Calgary.

In July, each year, an increasing number of people are attracted to the Calgary Exhibition and Stampede, and visitors now exceed half a million. Amenities for sports are numerous; they include facilities for practically every popular outdoor and indoor recreational activity. The City Council is advised by a Recreation Commission, which is

specifically charged with the maintenance and improvement of these amenities. Fishing is provided locally by the Bow and Elbow rivers. Within a two-hour driving radius, there is hunting for game birds, antelope, deer, elk, moose, bear, bighorn mountain sheep, and goats. On St. George's Island there is a zoo and a park containing one of the best existing collection of life-size models of prehistoric animals. Mention has already been made of the nearness of Calgary to Banff National Park.

Shopping Centres

Downtown Calgary is still the main shopping district, and two of the larger department stores operate car garages for customers' use. The trend toward suburban shopping centres has started with a development by Simpson-Sears, and the North Hill Shopping Centre, due for completion in the spring of 1958. Three other centres are in the planning stage.

Industrial Districts

Details of industrial and commercial development locations within the metropolitan area are as follows:

Two planned Industrial Districts—Highfield and Manchester—fully serviced and municipally owned (Approximately \$1,500,000 investment).

Basic Land Price \$1,600 per acre.

Cost of utilities, rail lead past property plus rough grading approximately \$4,400 - \$6,000 per acre.

Highfield Industrial Park—200 acres at \$6,750 per acre. Zoning General Light Industrial. Building, set back and performance standards in effect. Served by C.N.R. Outside interswitching limits. Bus service early morning—late afternoon. Privately-owned property adjoining subject to same conditions. Adjacent to Traffic Diversion Artery.

Manchester Industrial District—240 acres at \$5,000-\$6,750 per acre.

Heavy Industrial zoning. Building, set back and performance standards in effect, but vary in different locations. Served by C.P.R. Outside interswitching limits. Bus service early morning and late afternoon. Privately-owned

property adjacent subject to same conditions. Adjacent to Traffic Diversion Artery.

Bonnybrook Industrial District—360 acres.

Heavy Industrial zone. No building restrictions but subject to performance standards. Served partly by C.P.R. and C.N.R. and within interswitching limits. Bus service—good schedule. Area is filling up rapidly. City-owned property now limited.

Undeveloped private property on River front and scattered throughout district amounts to approximately 80 acres (1957).

Industrial water wells possible in defined area. City power and services available or can be extended.

North Calgary Industrial District—360 acres.

Light Industrial zone. Building restrictions and performance standards in effect. Only a few sites served by rail (C.P.R.). Bus service to be extended to serve this area. Area is filling up rapidly.

Undeveloped private property on Airport Highway and scattered throughout area amounts to approximately 60 acres (1957).

City power and services available or can be extended.

Ogden-Barlow Industrial District—1,800 acres.

This area in planning stage—area will be subdivided into a variety of parcel sizes—minimum 10 acres. Zoning will be carried out with regard to proposed arterial highways and existing housing. Performance standards for smoke, dust and smell will be reviewed. Rail service will be provided jointly by C.P.R. and C.N.R. Power and water will be installed as requested. Septic tanks will be installed by purchaser. It is unlikely that water wells will prove satisfactory.

"Meridian" Industrial District—

Situated at the southeast corner of the clover-leaf intersection of (No. 1) Trans-Canada, and (No. 2) Edmonton Highways, outside and immediately adjoining the eastern city limits, an area comprising some 210 acres is being developed by private interests.

Subdivision into suitable parcels is completed. Zoning is Highway Industrial--Commercial along the two highways, grading to General Industrial at the rear.

CAMROSE

Transportation Facilities

Camrose, recently incorporated as a city, is located southeast of Edmonton. By main road, the route to Edmonton leads west via Highway No. 13 to Wetaskiwin and north via Highway No. 2. The total distance is 68 miles. The cross-country route to Edmonton via Hay Lakes is some 52 miles. The distance to Saskatoon via Highways 13 and 14 is some 325 miles.

Camrose is the junction of the Canadian Pacific Railway line between Wetaskiwin and Saskatoon, and the Canadian National Railways lines leading to Edmonton (northwest), Tofield (north), Vegreville (northeast), Alliance (southeast), Stettler and Drumheller (south), and Alix (southwest). Trains via Drumheller or Alix proceed to Calgary. Long distance bus services operating between Edmonton, Macklin, and Saskatoon, Edmonton and Alliance, and Edmonton and Alix via Hay Lakes pass through Camrose. There is also a city bus service. Two trucking companies offer regular long distance road haulage facilities.

Population

The city population in census years has been as follows:

1946	2,967
1951	4,131
1956	5,817

The city's trading area is bounded by a line drawn roughly through the following localities:

North	Tofield
Northwest	Hay Lakes
West	Bittern Lake
Southwest	Dorelee
South	Meeting Creek
Southeast	Alliance and Hardisty
East	Phillips, Kinsella and Viking

The trading area population in 1956 has been estimated at 53,370 of which 18,000 are urban and 35,370 are farm dwellers.

Climate

The altitude of Camrose is 2,430 feet. While winters may be cold, there is moderate precipitation with little snowfall. Nights are pleasantly cool even after the hottest summer days.

Geography

The city lies in a shallow valley through which flows Stoney Creek, a tributary of the Battle River. The valley is well wooded with poplar, willow, and other deciduous trees.

Very fertile black soils cover the area surrounding the city. The natural vegetation is parkland; a high percentage of the land is used for mixed farming and cereal production.

Water Supply

Water is supplied from a reservoir on Camrose Creek. It is distributed by Calgary Power Ltd. at the following rates:

A Minimum Monthly Charge of \$3.00 gross, subject to a prompt payment discount of 25c, making \$2.75 net, the said minimum charge to include payment for monthly consumption up to 200 cubic feet;

Next 4,800 cubic feet per month at 55c per 100 cubic feet.

All over 5,000 cubic feet per month at 50c per 100 cubic feet.

Commercial and Industrial

Special rates are available upon application, according to consumption

Fuel and Power

(a) ELECTRICITY: Supplied by Calgary Power Ltd. at the following rates:

Domestic

Available only for lighting, heating, cooking, domestic power and other ordinary uses in private houses and individual apartments used exclusively for residential purposes.

First 20 K.W.H. (or less) per month \$2.30
Gross Minimum

Subject to 30 cents prompt-payment discount, making \$2.00 Net Minimum

All over 20 K.W.H. used per month 1.5 cents net per K.W.H.

Note: Discount of 30 cents applies on all bills paid within the discount period.

The foregoing rate applies where the maximum demand does not exceed 5 K.W.

Where the demand exceeds 5 K.W. an additional monthly demand charge of 50 cents per K.W. will be made.

Commercial

Available where other rates listed do not apply.

Service Charge—

On the First 500 watts of installed capacity 60 cents per month.

On each additional 250 watts of installed capacity 20 cents per month.

Energy Charge—

First 50 K.W.H. per month per K.W. of installation 6 cents per K.W.H.

Next 150 K.W.H. per month per K.W. of installation 2 cents per K.W.H.

All over 200 K.W.H. per month per K.W. of installation 1.5 cents per K.W.H.

Minimum Charge—\$1.25 per month.

Power - (A.C.)

Available for motors, rectifiers, commercial heating apparatus, etc., in commercial establishments.

Service Charge—

\$1.00 per month per K.V.A. of installation, (one motor H.P. or one K.W. in resistance heating apparatus to be considered equivalent to one K.V.A.)

Energy Charge—

First 100 K.W.H. per month per K.V.A. of installation 3-1/3 cents per K.W.H.

All over 100 K.W.H. per month per K.V.A. of installation 1-2/3 cents per K.W.H.

Minimum Charge—\$3.00 per month, or the amount of the service charge, if greater.

(b) NATURAL GAS: This is supplied by Northwestern Utilities, Limited. The rates are as follows:

General Rates

First 3 M.C.F.	\$2.50 per month
Additional M.C.F.	\$0.38 per M.C.F.

Optional Rates (on annual contract where consumption is over 741 M.C.F.)

Fixed charge	\$10.00 per month
Usage rate	\$ 0.24 per M.C.F.

High Load Factor Rates

Fixed Charge—

\$20.00 per month plus

\$ 1.75 per month per M.C.F. of maximum 1-hour demand.

Commodity Charge—

First 1,000 M.C.F. per month \$0.17 per M.C.F.

Next 1,000 M.C.F. per month \$0.15 per M.C.F.

All additional M.C.F. per month \$0.13 per M.C.F.

Taxation

The 1957 mill rate was 55, consisting of:

Municipal	27
School	26
Hospital	2

Industrial Development

Camrose is the centre of a prosperous mixed farming district which is prominent for its hog and cattle production. Coal mines situated at Ohaton, Dodds, Rosalind, and Round Hill contribute to the city's economy, and there are five producing oil wells within the city limits. There are a number of oil fields adjoining the city limits. These have increased the prosperity not only of the farmers who have benefited by surface rentals and oil leases, but also of the city which has had an influx of oil company office buildings, repair and

aintenance depots, and employees who reside there.

The city has an up-to-date planning report, prepared by the Town and Rural Planning Branch of the Provincial Government. The report suggests various areas suitable for industry and indicates Camrose is well supplied with industrial land that can be serviced by one or both of the railways serving the city.

Camrose has approximately 20 acres zoned for light industry on the north and east city limits, and about 6 acres zoned for heavy industry. Both areas are served by the Canadian Pacific Railway and Canadian National Railways. The land is owned by the city, the railways and privately. The cost would range from the assessed value up. Building, set-back and performance standards are in effect. Inside interswitching limits. City power and ser-

vices are available or can be extended. The city has approximately 80 acres of land available for existing and future industrial extension.

Amenities

Health facilities include a 100-bed hospital. Education includes instruction from grades one to twelve and extra-curricular subjects taught in the high schools, one of which is a boarding school. There is a public library. Sports facilities include a swimming pool, an artificial ice curling rink, a covered hockey and skating rink, a golf course, and tennis courts. There are summer swimming, boating, and fishing resorts at Tillicum Beach, 9 miles to the southeast, at Pigeon Lake 50 miles east, and at Buffalo Lake, 35 miles south. In winter there is good skiing near the city.

DRUMHELLER

Transportation Facilities

The City of Drumheller is located on the Red Deer River, northeast of Calgary. Its distance via Highway No. 9 is 88 miles from Calgary, and 338 miles from Saskatoon. Secondary roads lead from the city to Stettler (north) and to the Trans-Canada Highway (south).

Drumheller is the junction of Canadian National Railways lines from Calgary to Edmonton and from Calgary to Saskatoon, with the Canadian Pacific railway branch line from Calgary to Rosemary, via Teiseker. Buses operate among the neighbouring points in the Drumheller Valley, and to such destinations as Hanna, Saskatoon, Stettler, and Calgary.

Population

The population in census years has been as follows:

1946	2,659
1951	2,601
1956	2,632

The trading area includes the mining communi-

ties in the Drumheller Valley and is bordered by Rumsey, Carbon, Rockyford, Dorothy, and Delia. The trading area population in 1956 has been estimated at 40,000.

Labour Force

The registered labour force for 1957 was 1,100.

Climate

The altitude of Drumheller is 2,259 feet. Mean seasonal and annual figures are as follows:

Mean summer temperature	57 degrees F.
Mean winter temperature	18 Degrees F.
Mean annual temperature	38 Degrees F.
Mean annual precipitation	12.37 inches

Geography

The city lies on the south bank of the Red Deer River in the Drumheller Valley. The natural vegetation of the district is short grass prairie. The dark brown soil is very productive when moisture conditions are favourable. The quality of the wheat

grown in the area is excellent, as is indicated by the number of wheat kings that have come from this part of Alberta.

Water Supply

Water is pumped from a well fed by infiltration from the Red Deer River to an elevated tank. Rates are as follows:

Domestic Flat rate of \$2.50 per month.

Commercial—

First	5,000 gallons at 75 cents per M.I.G.
Next	5,000 gallons at 69 cents per M.I.G.
Next	10,000 gallons at 63 cents per M.I.G.
Next	30,000 gallons at 56 cents per M.I.G.
Next	50,000 gallons at 50 cents per M.I.G.
Next	100,000 gallons at 44 cents per M.I.G.
All over	200,000 gallons at 38 cents per M.I.G.

Industrial (Over 1 million gallons consumption per month) 17.5 cents per million gallons.

Fuel and Power

(a) ELECTRICITY: Three phase 60 cycle current power is supplied to the city under franchise by Canadian Utilities Limited from their steam generating plant in the city. This plant also supplies the surrounding area, including the coal mines in the Drumheller Valley. Rates in the city are:

Residential Schedule

Demand Charge—50 cents per month.

Energy Charge—5 cents per K.W.H. for first 25 K.W.H.

2.5 cents per K.W.H. for next 100 K.W.H.

1.5 cents per K.W.H. for balance

Minimum monthly charge \$1.25 per month.

Commercial Schedule

Demand Charge—

50 cents per month per K.W. connected load.

Energy Charge—

5 cents per K.W.H. for first 50 K.W.H.

4 cents per K.W.H. for next 100 K.W.H.

3 cents per K.W.H. for balance

Minimum demand charge—

\$1.25 per month per meter.

Power Services

Demand Charge—Nil

Energy Charge—

5 cents per K.W.H. for first 25 K.W.H./H.P.

3 cents per K.W.H. for next 50 K.W.H./H.P.

2 cents per K.W.H. for balance

Minimum—\$1.00 per H.P. of connected load but not less than \$2.00 per meter.

Flat rates are available for residential water heaters, window and sign lighting, and commercial heating and cooking.

(b) NATURAL GAS: Plains Western Gas & Electric Co. Ltd. supplies gas at the following rates:

First 3 M.C.F. at \$2.50

Next 40 M.C.F. at \$0.46 per M.C.F.

Next 77 M.C.F. at \$0.42 per M.C.F.

Over 120 M.C.F. at \$0.38 per M.C.F.

Minimum monthly charge—\$2.50.

Taxation

The 1957 mill rate was 70 and is made up as follows:

Municipal	31.4
School	22.6
Hospital	8.5
Library	0.8
Debentures	5.7
Health Unit	1.0

Assessment is:

Land	100 per cent of 1942 value
Improvements	60 per cent of 1942 value

Industrial Development

The industries of the Drumheller district are coal mining, oil and natural gas production, and agriculture. Farming in this area is famous for its high grade livestock and wheat. The area is known for its production of high grade sheep, the cattle

population is in excess of 50,000 head, and feed lot operations are extensive in the area. The Drumheller, West Drumheller and Wayne oil fields and the Rosedale natural gas field have brought oil well supply and servicing firms to the city. Personnel working in the fields have taken up residence in or near the city. There are a number of gas wells in the area from which gas can be purchased direct at very favourable rates. Deposits of gravel, sand, bentonite and clay are located near the city.

Coal mining is still an industry of great importance to the city's economy. Eleven companies operate mines in the Drumheller Valley, some of them on a 24-hour basis from August through April. During the spring and summer mining is intermittent. New investment in mining continues: one company recently spent \$1 million developing and completely mechanizing one of the mines in the valley. New users of coal in the district are exemplified by a Canadian Utilities 32,000 kilowatt coal-fired steam-electric plant which went into operation in November, 1956, 70 miles north of Drumheller. The plant is designed for an ultimate capacity of 86,000 kilowatts and is additional to another coal-fired power plant at Drumheller.

Drumheller's distributive industries serve a substantial area extending to the Saskatchewan border. Manufacturing at present is restricted to a sash, door and planing mill, a meat storage plant, two machine shops, a bakery, a poultry hatchery, and a bottling plant.

Future industrial development will be assisted by the abundance of coal, plentiful supplies of cheap water, reasonable electric power rates, local natural gas, and high grade crude oil. Good industrial sites are available adjacent to or near city limits, on the Red Deer River. Utilities will be available to these sites which are passed by paved roads and railways.

Amenities

Education is provided for grades one to twelve. There is a public library. Health facilities include a 110-bed municipal hospital with an anaesthetist and a resident interne and a clinic of eight doctors.

Many sports facilities are available. There is a city-owned swimming pool; the Red Deer River and Fish Lake, 20 miles away, offer good boating; in addition to the Red Deer River, artificial lakes eight miles away, stocked with trout, provide fishing. A variety of game birds, and deer are hunted in the vicinity of the city. There is a baseball park, a curling rink with artificial ice, and a municipal arena for skating and hockey. There is a golf course, and tennis courts. There are nine churches and eleven fraternal lodges. The city is the religious, recreational and cultural centre for surrounding communities, and consequently it is more active in these fields than many localities of similar size.

EDMONTON

Transportation Facilities

Alberta's capital city, Edmonton, is located 60 miles south of the geographical centre of the province. It stands on the north Saskatchewan River, which is spanned by four bridges at Edmonton. Road communications include Highway No. 2, which runs south through Calgary to the United States border and north to Peace River and the Alaska Highway, and Highway No. 16 which leads west to Jasper, and east to Lloydminster. Two other highways run out of the city towards the northeast and one to the southeast. Road distances to selected locations are:

	Miles
Calgary, Alberta	189
Dawson Creek, British Columbia	470
Jasper, Alberta	228
Regina, Saskatchewan	543
Saskatoon, Saskatchewan	358
Vancouver, British Columbia	988
Winnipeg, Manitoba	924

Rail services include the following:

Canadian National Railways: To Wainwright, Saskatoon and Regina; to Wainwright,

Saskatoon and Waterous; to Calgary via Camrose and Drumheller; to Calgary via Camrose and Mirror; to Vegreville, Lloydminster and Saskatoon; to Edson, Jasper and Vancouver; to Edson, Jasper, Prince George and Prince Rupert; to Whitecourt; to Bonnyville, St. Paul and Heinsburg.

Canadian Pacific Railway: To Saskatoon via Wetaskiwin and Camrose; to Calgary; to Vegreville and Lloydminster; to Stettler and Coronation via Lacombe; to Winfield via Leduc.

Northern Alberta Railways: To Dawson Creek via McLennan and Grande Prairie; to Hines Creek via McLennan and Peace River; to Waterways via Lac la Biche.

Edmonton's modern municipal airport handles a greater volume of traffic than any other in the province. Scheduled passenger flights are operated as follows:

Canadian Pacific Air Lines: Daily flights between Edmonton, Grande Prairie, Fort St. John and Whitehorse; Edmonton, Fort McMurray and Uranium City; Edmonton, Grande Prairie, Fort St. John, Prince George and Vancouver; Edmonton, Lloydminster, Saskatoon, Moose Jaw, Regina and intermediate stops.

Less than daily flights between Edmonton, Grande Prairie, Peace River and intermediate stops to Yellowknife; Edmonton, Fort McMurray and intermediate stops to Yellowknife; Edmonton, Fort McMurray and intermediate stops to Norman Wells, connecting with flights to and from Aklavik.

Trans-Canada Air Lines: Several flights daily, tourist and first class, in each direction on the Across-Canada service, between Montreal and Vancouver; the Foothills and Prairies services between Winnipeg and Edmonton, Calgary and Edmonton, Lethbridge and Winnipeg.

Northwest Orient Airlines: Daily flights between Edmonton, Minneapolis-St. Paul and Chicago.

Weekly flights between Minneapolis-St. Paul, Edmonton and Anchorage, Alaska.

Western Airlines: Daily flights between Edmonton, and Great Falls, Montana, connecting with this company's flights to and from Salt Lake City, Denver, Los Angeles and Mexico City.

Canadian Pacific Air Lines operate scheduled cargo services on their Edmonton-Fort McMurray-Uranium City and Edmonton-Fort McMurray-Yellowknife services. Numerous carriers and private companies operate charter flights out of Edmonton.

Bus coverage is complete both for local points and for more distant centres. The city-owned transport system operates buses, street cars, and trolley buses.

Ten licensed truck depots are maintained in the city, and numerous other firms with offices in the district provide a comprehensive long-distance road haulage service between Edmonton and many places in the province, as well as major centres in Western Canada and the United States.

Population

The population of the Edmonton metropolitan area in census years has been as follows:

Year	City	Beverly	Jasper Place	Strathcona (part)	Stony Plain (part)	Sturgeon River (part)	Total Metropolitan Area
1946 -	-	114,976	1,163	3,800	—	—	—
1951 -	-	159,631	2,159	9,139	1,814	32	973
1956 -	-	226,002	4,602	15,957	2,084	83	2,276
							251,004

The population of the metropolitan area of Edmonton shows a growth between 1951 and 1956 of 44.5 per cent. This is the largest growth rate of any metropolitan area in Canada, only approached by metropolitan Calgary's gain of 42.5 per cent over the same period. The five-year growth in population of the city proper for Edmonton was nearly as rapid as that of the metropolitan area, at 41.6 per cent; the corresponding figure for Calgary is 40.8 per cent.

Edmonton's trading area reaches Lloydminster in the east, Jasper in the west, and Red Deer in the south. In the north it takes in the Northwest Territories. Goods are distributed from the city also to the Peace River Block in British Columbia, the Yukon, and Alaska. The 1956 population of this area was over 600,000.

Labour Force

The labour force of the metropolitan area was 110,000 at September, 1957.

Climate

The altitude of Edmonton is 2,205 feet. The city's winter climate is relatively cold but dry and sunny, in summer the hottest days are followed by cool nights. There is moderate snow and rainfall is sufficient for successful farming. Mean daily maximum temperatures (56-year average) are 15°F. in January and 74°F. in July.

Geography

Edmonton occupies part of a wooded plain through which the North Saskatchewan River has cut a winding valley about two hundred feet deep, with an average width of about three-quarters of a mile where it divides the city into North and South Edmonton. The river itself averages about 700 feet in width at this point. Branching out from the valley are several deep ravines that soon taper out on the higher ground. These ravines and the river banks are thickly wooded with both deciduous and evergreen trees. The Edmonton area is natural parkland, or grassland invaded by woodlands of mainly deciduous trees. A high percentage of the land surrounding the city is arable, and is used for mixed farming and the production of cereals and vegetables.

Water Supply

The water supply system is municipally owned. Water is obtained from the North Saskatchewan River, and reaches consumers via treatment plants and pumping stations. A two million dollar expansion of these installations was recently completed and is considered adequate for needs at present and in the foreseeable future. Water rates are as follows, subject to five per cent discount if payment is made within ten days of the invoice date:

Consumption per month								Rate per 100 cubic feet (cents)	Minimum Charge per month (dollars)
0 -	800 cubic feet	-	-	-	-	-	-	37	1.48
801 -	1,800 cubic feet	-	-	-	-	-	-	34	2.96
1,801 -	4,000 cubic feet	-	-	-	-	-	-	31	6.12
4,001 -	7,000 cubic feet	-	-	-	-	-	-	28	12.40
7,001 -	13,600 cubic feet	-	-	-	-	-	-	25	19.60
13,601 -	21,000 cubic feet	-	-	-	-	-	-	23	34.00
21,001 -	28,000 cubic feet	-	-	-	-	-	-	22	48.30
28,001 -	36,000 cubic feet	-	-	-	-	-	-	20	61.60
36,001 -	100,000 cubic feet	-	-	-	-	-	-	19	72.00
100,001 -	500,000 cubic feet	-	-	-	-	-	-	17	190.00
500,001 -	1,500,000 cubic feet	-	-	-	-	-	-	16	850.00
1,500,001 -	3,000,000 cubic feet	-	-	-	-	-	-	15	2,400.00
3,000,001	cubic feet and up	-	-	-	-	-	-	13	4,500.00

Fuel and Power

(a) **Electricity:** The electric light and power distribution system is city-owned. All rates are subject to five per cent discount if paid within ten days of date of invoice.

Three Phase Power — 220 Volt

First 500 K.W.H. at 1.2 cents per K.W.H.
Next 1,500 K.W.H. at 1.1 cents per K.W.H.
Next 3,000 K.W.H. at 1.0 cents per K.W.H.
Over 5,000 K.W.H. at 0.9 cents per K.W.H.

Plus a service charge of 50 cents per H.P. connected or K.V.A. demand.

Minimum Charge, First 20 H.P. connected load, 75 cents per H.P. per month. All over 20 H.P. connected, 50 cents per H.P. per month.

Minimum Bill—\$2.25 per month.

Commercial Power — 2,300 Volt Service, 75 K.V.A. or Over

Customer supplying all transformers, switching equipment, etc. Service to be taken at 2,300 Volt, balanced three phase and having a measured maximum demand of not less than 75 K.V.A., taking a minimum consumption of 10,000 K.W.H. per month.

First 100 Hours use of K.V.A. of demand at 1.1 cents per K.W.H.

Next 100 Hours use of K.V.A. of demand at 1.0 cents per K.W.H.

Next 200 Hours use of K.V.A. of demand at 0.9 cents per K.W.H.

Over 400 Hours use of K.V.A. of demand at 0.8 cents per K.W.H.

Plus a service charge of 50 cents per K.V.A. of demand taken at the highest 15-minute interval in any one month, and this shall be accepted as the maximum demand for the succeeding twelve months, or until a greater demand is established.

Minimum bill—\$145.00 per month.

Industrial Power — 2,300 Volt Three Phase Service, 75 K.V.A. or Over

Customer supplying all transformers, switching equipment, etc. Service to be taken at 2,300 Volt,

balanced three phase and having a measured maximum demand of not less than 75 K.V.A., taking a minimum consumption of 10,000 K.W.H. per month.

First 50 Hours use of K.V.A. of demand at 1.1 cents per K.W.H.

Next 50 Hours use of K.V.A. of demand at 1.0 cents per K.W.H.

Next 100 Hours use of K.V.A. of demand at 0.9 cents per K.W.H.

Over 200 Hours use of K.V.A. of demand at 0.8 cents per K.W.H.

Plus a service charge of 50 cents per K.V.A. of demand taken at the highest 15-minute interval in any one month, and this shall be accepted as the maximum demand for the succeeding twelve months, or until a greater demand is established.

Minimum bill—138.75 per month.

Wholesale Power — 13,200 Volt, 200 K.V.A. Demand or Over

Customer supplying all transformers, switching equipment, etc. Service to be taken at 13,200 Volt, balanced three phase and having a measured maximum demand of not less than 200 K.V.A., taking a minimum consumption of 50,000 K.W.H. per month.

First 25 Hours use of K.V.A. of demand at 1.1 cents per K.W.H.

Next 25 Hours use of K.V.A. of demand at 1.0 cents per K.W.H.

Next 50 Hours use of K.V.A. of demand at 0.9 cents per K.W.H.

Over 100 Hours use of K.V.A. of demand at 0.8 cents per K.W.H.

Plus a service charge of 50 cents per K.V.A. of demand taken at the highest 15-minute interval in any one month, and this shall be accepted as the maximum demand for the succeeding twelve months, or until a greater demand is established.

Minimum bill—\$535.00 per month.

Combined Wholesale Light and Power Low Voltage Network Rates

Service to be taken at 120/208 Volt, balanced three phase four wire, and having a measured maximum demand of not less than 75 K.V.A. taking a

minimum consumption of 10,000 K.W.H. per month.

First 60 Hours use of K.V.A. of demand at 1.2 cents per K.W.H.

Next 100 Hours use of K.V.A. of demand at 1.1 cents per K.W.H.

Next 100 Hours use of K.V.A. of demand at 1.0 cents per K.W.H.

Over 260 Hours use of K.V.A. of demand at 0.9 cents per K.W.H.

Plus a service charge of 50 cents per K.V.A. of demand taken at the highest 15-minute interval in any one month, and this shall be accepted as the maximum demand for the succeeding twelve months, or until a greater demand is established.

Minimum bill—\$152.00 per month.

(b) **Natural Gas:** Natural gas is supplied under franchise by Northwestern Utilities, Limited from the Viking-Kinsella and Leduc Fields, at the following rates:

General Rates*

First 3 M.C.F.	\$2.40 per month
Additional M.C.F.	\$0.25 per M.C.F. per month
Minimum	\$2.40 per month

Commercial and Industrial Rates

If annual consumption is between 9,671 and 42,000 M.C.F.: \$50.00 per month fixed charge plus \$0.19 per M.C.F.

If annual consumption is over 42,000 M.C.F.: \$120.00 per month fixed charge plus \$0.17 per M.C.F.

High Load Factor Rates

Two contract rates are available to major consumers. The lowest rate is \$20.00 per month fixed charge, plus \$1.00 per month per M.C.F. of maximum 12-hour demand, plus commodity charges scaled down to \$0.10 per M.C.F.

Taxation

The mill rate in 1957 was made up as follows:

	Mills
General Municipal Purposes	6.61
General Debenture Interest and Redemption	12.85
Public School District	31.00
Separate School District	
Hospital Plan	2.30
Library Board	1.21
Total Mill Rate	54.00

A business tax is levied on the basis of the assessment of the current rental value of the premises occupied. This is six per cent for manufacturers and 15 per cent for other types of business.

Industrial Development

Edmonton is a centre of industrial development, in the midst of the greatest concentration of oil wells in Canada. The Leduc oil field is about 20 miles to the south, the Redwater field about fifty miles to the northeast, and the newer Pembina field about sixty-five miles west. These are only the largest and best known fields; others are nearby. Edmonton is also the terminus of the Interprovincial pipeline carrying oil to the Great Lakes and as far as Sarnia, and the Trans Mountain pipeline carrying oil to Vancouver. Three major oil refineries with a total crude oil capacity of 40,000 barrels per day are located on the western outskirts of the city. There is a lubricating oil plant, representing an investment of \$15 million, and petrochemical plants clustered around the city representing an investment of \$100 million. A \$25 million nickel refinery at Fort Saskatchewan, like most of the other industries, uses natural gas.

Other large industrial undertakings include a \$12 million cement plant, a \$4 million plant for grinding cement clinker, a \$2 million steel mill, a \$1,500,000 steel fabricating mill, and a \$7 million pipe mill with a rated capacity of 150,000 tons per year. At Hinton, 185 miles west of the city, a \$35 million bleached sulphate pulp mill has been erected.

Alberta's agricultural industry remains an important factor in Edmonton's economy. The city is

* Details as to demand charges and terms of contract can obtained from Northwestern Utilities Limited, The Milner Building, Edmonton.

the distribution and processing centre for produce from the surrounding mixed farming area, such as wheat, barley, oats, rye, livestock and vegetables. Stockyards, packing plants, grain elevators and canneries exemplify industry based on agriculture. Edmonton also serves as marketing and distributing centre for a trading area extending well beyond the boundaries of Alberta and particularly to the north.

Oil and gas resources in the area are constantly being developed for utilization by local plants and for export via the pipelines. The continued growth of the Edmonton metropolitan area is assured on the basis of future prospects of the Alberta economy in which the capital city occupies a central position.

Additional information on industrial development can be obtained from the Industrial Director, City Hall.

Amenities

Edmonton provides education at all levels. The University of Alberta has degree courses in arts and science, agriculture, commerce, dentistry, education, engineering, household economics, law, medicine, nursing and pharmacy. There are also post-graduate courses in many subjects and an extension department.

Other schools provide instruction for grades one to twelve and courses in commerce, speech, arts, music, church leadership, basic English and citizenship, vocational subjects, etc. A separate school system for Roman Catholics provides instruction in grades one to twelve, commercial subjects, and evening classes for New Canadians. There are several private schools teaching a variety of subjects. There are public libraries and book-mobiles, a museum of art, and a zoo.

There are eight hospitals with a total of 3,081 beds and a variety of health services.

Recreational facilities include 2,000 acres of parks and playgrounds, golf courses, a stadium and several athletic parks, tennis courts, bowling greens, indoor and outdoor swimming pools, skating and curling rinks, diamonds for hard and softball games and a cricket ground. Near the city numerous lakes provide boating, swimming, fishing and camping facilities. Game in the vicinity of Edmonton in-

cludes game birds and bighorn sheep, mountain goat, caribou, elk, mule deer, moose and bear.

Shopping Centres

The City of Edmonton has excellent shopping facilities. Westmount Shoppers Park is one of the largest in North America with customer parking for 3,500 cars. A Simpson-Sears shopping centre has just been opened. Still a larger shopping centre is in the planning stage. Downtown Edmonton has a number of national and locally-owned department stores, some of which have ramp garages.

Industrial Districts

Details of industrial and commercial development locations within the Edmonton metropolitan area are as follows:

The Bremner Huff Industrial Subdivision. (N. of Edmonton). Total area approximately 200 acres. Light industrial—100 acres. Heavy industrial—150 acres. One-half city owned, one-half private. Prices range from \$4,000 to \$5,400 per acre (city) including spur to \$7,000 per acre private, local improvements excluded. Building set back and performance standards in effect. Served by Canadian National Railways, spurs constructed or under construction. Situated entirely within interswitching limits. Full services installed or in process. Bus service adjacent, extension planned for immediate future. Truck routes on four sides. This area is about two-thirds filled or committed (1957). The remaining portion is owned about equally by the city and private owners. There is a wide variety of parcel sizes with and without trackage.

Mount Lawn Industrial Subdivision.

Sixty acres at \$4,000 to \$5,000 per acre plus local improvements. Price includes main spur where applicable. Light industrial 20 acres. Heavy industrial 40 acres. Scattered parcels (approximately 5 acres total) privately owned. Building set back and performance standards in effect. Served by Canadian National Railways. Main lead in process. Adjacent to Canadian National Railways main line. Main truck route through area. Utilities under construction. Full regular bus service. This area

is two-thirds committed (1957). Trackage and non-trackage parcels available; vary from 1 acre to 4 acres.

Coronet Industrial Subdivision (S.E. Edmonton).
130 acres privately owned, carefully planned for heavy industry (useable by light industry). Prices range \$5,000 per acre to \$8,000 per acre plus local improvements. Spur included where applicable. Full services available. Canadian Pacific Railway trackage within interswitching limits. Approximately 120 acres available (1957).

South Allendale Industrial Subdivision (South Edmonton).
Approximately 20 acres remain (1957), all privately owned in choice locations adjacent to or on main highway. No trackage. Price \$9,000 to \$12,000 per acre. Services available. Building set back in effect.

Rosedale Industrial Subdivision (S.E. Edmonton)
Approximately 40 acres—half private, half city owned. Ten acres with trackage—Canadian Pacific Railway. Within interswitching limits. Price—\$4,500 - \$5,000 plus local improvements (city owned) \$6,000 - \$8,000 private owned. Building set back and performance standards in effect. Main truck route adjacent. Utilities partially complete, remainder under construction.

Hazeldean Industrial Subdivision.
Approximately 40 acres—one-quarter city owned, three-quarters privately owned. Light industrial—20 acres. Heavy industrial—20 acres. Ten acres with trackage—Canadian Pacific Railway. Within interswitching limits. Utilities installed. Area one-third committed. Price \$4,500 - \$5,000 plus local improvements (city owned); \$6,000 - \$8,000 plus local improvements (private). Main truck route adjacent. Set back and performance standards in effect.

GRANDE PRAIRIE

Transportation Facilities

The City of Grande Prairie is located in the southern part of the Peace River country on Bear Creek, between Bear Lake and its confluence with the Wapiti River. Highway No. 2, which passes through the city, leads west to Dawson Creek, 93 miles distant, where it joins with the road branching south to Prince George, and the Alaska Highway which leads to Whitehorse, Yukon, and Fairbanks, Alaska. Northeast from Grande Prairie, Highway No. 2 leads to Peace River where it connects with the Mackenzie Highway. Highway No. 34 runs east to the Lesser Slave Lake and on to Edmonton, the total distance to the capital being 380 miles. By the newly-constructed Highway No. 43, which runs via Whitecourt, the distance to Edmonton is 292 miles.

Rail service is provided by the Northern Alberta Railways between Dawson Creek and Edmonton. A line is presently being constructed by the Pacific Great Eastern Railway from Prince George to Dawson Creek. Once this is completed, Grande Prairie will have rail connection to tidewater at Prince

Rupert and Vancouver. The town is served by Canadian Pacific Air Lines services as follows:

Edmonton to Yellowknife service
3 flights per week each way.
Edmonton, Prince George, Vancouver service
6 flights per week each way.
Edmonton to Whitehorse service
6 flights per week each way.

Two trucking companies which undertake long distance haulage from Grande Prairie to points in Alberta and British Columbia maintain depots in the town.

Population

The city population in census years has been:

1946	2,267
1951	2,664
1956	6,302

The city's trading area is bounded on the north by the Peace River, in the south by the end of settlement (approximately 20 miles), in the west by Hythe, and in the east by Sturgeon Lake. The estimated trading area population in 1956 was 25,000.

Climate

Average annual rainfall at Grande Prairie is over 10 inches, while total snowfall averages 66 inches. Mean daily maximum temperatures (10-year averages) are -7°F . in January and 73°F . in July.

Geography

The part of the Peace River country in which Grande Prairie is situated is marked by rolling plains and areas of spruce and poplar trees; the vegetation varies from parkland to heavily wooded.

The soils vary from about 12 inches of black surface to grey surface. The black soils, which are often of a silty nature, are usually found in the valleys and on slopes, while grey soils are found at higher elevation. Lime is found at depths of 30 to 40 inches.

Good yields of wheat are obtained on the black and dark coloured soils in the surrounding area. Mixed farming is carried out generally on grey soils under a system including legumes and fertilizers. With adequate rotation, coarse grains are grown successfully on this soil.

Water Supply

Water is obtained from Bear Creek on which the city reservoir is located. The rate is \$1.00 per 1,000 gallons with a minimum monthly bill of \$3.00. Special rates are arranged for consumers using over 1,000,000 gallons per annum.

Fuel and Power

(a) ELECTRICITY: Three phase 60 cycle power is supplied by Canadian Utilities Limited at the following rates:

Domestic

Demand Charge—

75 cents per month

Energy Charge—

Scaled from 9 cents to 3 cents per K.W.H.

Commercial

Demand Charge—

50 cents for first 1,000 watts of connected load.
25 cents for each additional 1,000 watts.

Energy Charge—

First 50 K.W.H. per month per 1,000 watts connected load 9 cents per K.W.H.

Next 100 K.W.H. used per month 8 cents per K.W.H.

Next 400 K.W.H. used per month 5 cents per K.W.H.

All additional K.W.H. used per month 4 cents per K.W.H.

Industrial

Energy Charge—

First 25 K.W.H. per month per H.P. connected 8 cents per K.W.H.

Next 25 K.W.H. per month per H.P. connected 6 cents per K.W.H.

Next 50 K.W.H. per month per H.P. connected 5 cents per K.W.H.

All further K.W.H. per month 4 cents per K.W.H.

Minimum monthly charge of \$1.00 per connected H.P.

(b) NATURAL GAS: Natural gas is supplied by Grande Prairie Transmission Company and distributed by Northland Utilities Limited at the following rates:

First 4 M.C.F. — \$3.00

Each additional M.C.F. — \$0.70 per M.C.F.

Taxation

The 1957 mill rate was 55 and was made up as follows:

Municipal	20.3
Schools	30.0
Hospital	4.2
Library	0.5

Business tax is assessed by a rate, per square foot of space used, which is set in a by-law for each class of business. The assessment obtained is taxed at the same mill rate as for municipal purposes, i.e. 20.3 for 1957.

Industrial Development

The city lies in an agricultural area. The new road to Edmonton via Whitecourt has considerable importance, and the railway line under construction from Dawson Creek to Prince George will add to

the economic importance of this area. The area is well endowed with natural gas and oil which could provide a basis for future industries. Grande Prairie has become a distribution centre for the Peace River district.

Amenities

There is an elementary, intermediate, and secondary school system teaching grades one to twelve. Vocational training is also given, and the town has a public library. Health facilities include an 80-bed hospital.

Provincial parks are situated at Wapiti and Saskatchewan Lakes, and offer fishing, boating and swimming. Game birds are plentiful in the district. There is a golf course, a curling rink, skating rinks, a heated swimming pool, and tennis courts.

LETHBRIDGE

Transportation Facilities

The City of Lethbridge is located on the Oldman River in southern Alberta, at the intersection of Highway No. 3 (the route from Medicine Hat to Vancouver via Crowsnest), Highway No. 4 to Coutts and United States Points, and Highway No. 2 (leading from northern Alberta via Edmonton and Calgary, south into Montana). Paved roads from the city also include Highway No. 5 which leads to Waterton Lakes National Park and Waterton Glacier International Peace Park, and No. 23 to Vulcan; this road will be fully paved to Calgary by 1959. Road distances from Lethbridge to selected centres are:

	Miles
International Border at Coutts, Alberta	65
Fort Macleod, Alberta	28
Crowsnest Pass, Alberta	92
Medicine Hat, Alberta	104
Calgary, Alberta	139
Edmonton, Alberta	328
Vancouver, British Columbia	800
Great Falls, Montana	235
Spokane, Washington	388

Canadian Pacific Railway lines link the city with the following points:

West

Crowsnest Pass, Nelson, Vancouver

East

Winnipeg via Medicine Hat, and via Stirling

South

Great Falls, Montana, via Coutts

Southwest

Cardston via Stirling

Northeast

Turin via Picture Butte

North

Calgary via Macleod, and also Vulcan

Southeast

Saskatchewan via Stirling and Weyburn

Long distance bus services operate to numerous destinations in Alberta and in Montana. There is also a city bus transit service. There are ten licensed truck depots in Lethbridge; these, and other common carriers offer comprehensive long distance haulage facilities. All oil field equipment

moving by truck to Alberta oil fields passes through Lethbridge.

Daily Trans-Canada Air Lines flights between Winnipeg and Edmonton stop at Kenyon Field, a modern airport two and a half miles south of the city. A new 6,500 foot runway is now under construction, with a second planned. Flying times are:

To Calgary	55 minutes
To Edmonton	2 hours 55 minutes
To Medicine Hat	55 minutes

There is a daily Western Airlines service between Great Falls, Montana, and Edmonton which connects with flights to and from Salt Lake City, Denver, Los Angeles and Mexico City.

Population

The population in recent years has been as follows:

1941	14,612
1946	16,522
1951	22,947
1956	29,462
1957	30,323 (as of Feb. 15)

The rate of growth is considerable and the percentage increase of 28.4 between 1951 and 1956 is one of the higher rates in the country.

The city's trading area is bounded by the United States border, and by an arc drawn from Trail, through Nelson, Kootenay Bay, Nanton, Vulcan, and Bow Island to the junction of the Alberta-Saskatchewan-Montana borders. The 1957 trading population of the area has been estimated at 200,000.

Labour Force

A labour force of 13,000 was recorded for 1957.

Climate

The altitude of Lethbridge is 2,992 feet. The city's climate is milder than that of most other centres in Alberta. Lethbridge lies in the zone of

the Chinook winds, which contribute to the mildness of the winter climate. Its annual sunshine record over 31 years averaged 2,354 hours, and exceeds that of any other weather station in Canada. Mean daily maximum temperatures (30-year averages) are 27°F. in January and 78°F. in July. Average frost free period is May 9 to September 27. Building and construction proceed without interruption the year round.

Geography

Lethbridge is near the centre line of a strip of dark brown soil averaging about 40 miles in width. The natural vegetation is chiefly short grass prairie and the land is naturally good pasture land. Wheat is the principal crop of dry land farming, practised where better soil types prevail, and its quality is high. Lethbridge is the centre of the largest irrigation project in Canada.

When irrigated and fertilized, the soils produce sugar beets, other root crops, and a variety of vegetables such as onions, peas, beans, tomatoes, cucumber, corn and cauliflower. Canneries, freezing plants and sugar factories are located in the Lethbridge area. A science service laboratory connected to the experimental station is on the city outskirts.

Water Supply

(a) Irrigation: Lethbridge is the centre of Canada's largest irrigation area which, in December, 1956, covered 510,000 acres. It will cover 722,000 acres when proposed extensions on the St. Mary and Milk Rivers (southwest and south of the city) have been completed. The boundaries of the irrigated land are on the west of the St. Mary River, on the north the Little Bow and South Saskatchewan Rivers, on the south the Milk River. In the east they extend almost to Medicine Hat.

(b) Purified Water: Water is supplied by the city from the Oldman River via a sedimentation basin and filters. Rates are as follows:

Domestic—single family homes
\$2.00 for 400 cubic feet,
10c per subsequent 100 cubic feet.

Domestic—apartments, etc.
\$2.15 for 700 cubic feet,
thereafter at commercial rates.

Commercial

Scaled from 50c per 1,000
gallons to 11c per 1,000 gallons.

Water analysis throughout the year can be obtained from the Industrial Commissioner of the city.

Fuel and Power

(a) ELECTRICITY: Three phase 60 cycle power is supplied by the city's own thermal electric plant on the east bank of the Oldman River. Facilities exist for connecting the city's electricity supply to the Calgary Power Ltd. system in case of emergency. Rates are as follows:

General Rates (under 10,000 K.W.H. per month)

First 1,000 K.W.H.

— 3 cents per K.W.H.

Next 3,000 K.W.H.

— 2 cents per K.W.H.

Next 6,000 K.W.H.

— 1.5 cents per K.W.H.

Amounts in excess, up to 300

K.W.H. per K.V.A. demand

— 1.1 cents per K.W.H.

Excess over 300 K.W.H.

— 0.8 cents per K.W.H.

There is also a demand charge.

Industrial Rates

First 10,000 K.W.H.

— 1.4 cents per K.W.H.

Next 10,000 K.W.H.

— 1.0 cents per K.W.H.

Remainder, up to 300 K.W.H.,

per K.V.A. demand

— 0.75 cents per K.W.H.

Amounts in excess of 300 K.W.H.,

per K.V.A. of monthly demand.

— 0.6 cents per K.W.H.

There is also a demand charge of 80 cents per K.V.A. of demand.

(b) NATURAL GAS: Natural gas is supplied from the Turner Valley, Foremost, and Bow Island fields by Canadian Western Natural Gas Company Limited. Rates are:

Domestic

First 2 M.C.F. per month

— \$2.50

All additional M.C.F. per month

— \$0.26 per M.C.F.

Minimum monthly charge

— \$2.50

Commercial and Industrial

Over 9,906 M.C.F. and under 34,000 M.C.F. per year—fixed charge of \$35.00 per month plus 22 cents per M.C.F. used.

Over 34,000 M.C.F. per year—\$120.00 per month plus 19 cents per M.C.F. used.

High Load Factor

Special rates are available descending to 13.5 cents per M.C.F.

Taxation

The 1957 mill rate was 69, made up of:

General	25.3 mills
School	30.0 mills
Hospital	12.1 mills
Rehabilitation	1.6 mills

Industrial Development

While coal laid the foundations for the economy of Lethbridge and the surrounding district, irrigation farming is at present the most important factor in the industrial development of the city. The growth of the city's population and high living standards are due chiefly to the prosperity and stability of farming in the area. On irrigated land drought no longer affect agriculture adversely; intensive farming is possible and a good living can be made on plots of 80 acres.

Sugar beet is the main crop, covering 38,000 acres, and producing 112 million pounds of sugar at three factories at Raymond, Taber and Picture

Butte, all within a 30-mile radius of the city. Other crops grown commercially, peas, tomatoes, mustard, carrots, string beans, dry beans, asparagus, potatoes, cabbage, pumpkin, table beets, corn, gherkins, cucumbers and parsnips, supply canneries, located at Lethbridge, Magrath and Taber. Lethbridge handles more mustard than any other centre in the world.

By-products of the sugar and canning factories feed livestock brought to the city from the farms and ranches for fattening for market in feed lots. On December 1, 1956, there were 90,000 cattle and 60,000 sheep in the feed lots. Farm, cannery and feed lot production will tend to increase with the extension of the irrigated area.

In 1956 Lethbridge stockyards handled 118,900 cattle, 98,010 hogs and 46,523 sheep. The majority of this stock went to Calgary, Vancouver, St. Boniface and Montreal. In addition, an unrecorded quantity of animals was trucked out to Calgary and Edmonton direct from the ranches, farms and feed lots. In 1957 there was a large movement to the United States.

There is a government experimental farm in the city, and science service laboratories engaged in research into cereal breeding, control of plant disease, crop and livestock pests, etc.

Coal mining in the Lethbridge area decreased between 1949 and 1954 due to the replacement of coal by natural gas and, on the railways, by diesel oil. Between 1954 and 1956 output increased by six per cent. At present, most of the coal produced is shipped to points outside the area which are not supplied with natural gas.

The 13,000 persons employed in the city in December, 1957, were distributed among trades and industries in the following proportions:

	Percent
Manufacturing (including food and beverage industries—7 per cent)	25
Retail	20
Construction	19
Finance and Services	17
Transportation	11
Wholesale	8

Manufacturing industries included feed and flour milling, a macaroni factory, vegetable canning, brewing, industrial mineral processing, dairying, steel fabrication, foundries, boiler manufacture, agricultural machinery, concrete products and diversified industries such as industrial gases. The relative importance of distributive trades reflects the city's importance in serving a large trading area population.

Future industrial development will be aided by the expansion of the irrigation district and its full utilization. Petrochemical industries may further contribute to this economic expansion; supplies of sulphur, crude oil, gasoline, propane and butane will be available from installations at the Pincher Creek Field, located 62 miles southwest of the city. There is a possibility of an iron ore smelter in the Crowsnest area which would undoubtedly add to the industrial potential of Lethbridge. The availability of metallurgical coals, and limestone, are important assets of the area.

Various sites (totalling 40 acres in 1957) are available within city limits for both commercial and industrial development. Prices at that time ranged from \$2,000 to \$3,000 per acre, including full services. These sites are served by the Canadian Pacific Railway and are within interswitching limits. A further 500 acres of privately-owned property within and adjacent to city limits is available at prices between \$500 and \$1,000 per acre without services. Negotiations are in progress for the inclusion within the city limits of a substantial industrial district to be served by trackage and city services.

Additional information on industrial development can be obtained from the Industrial Commissioner City Hall.

Amenities

Lethbridge has a well-built appearance; a Town Planning Commission has ensured a layout of wide streets and orderly building development.

Educational establishments include elementary, junior high and high schools. There is a separate Roman Catholic school system for grades one to twelve. Educational activities also include vocational training, night classes and evening instruction for New Canadians, and business and secre-

tial training. Approval has been given for the opening of Lethbridge Junior College, to be operated as a branch of the University of Alberta. There is a public lending library, a television station and radio station. A school bus service is in operation.

Health services include 404 hospital beds, a nursing mission, a welfare centre and a mental hygiene clinic.

Most indoor and outdoor sports are catered for, including skating, curling, golf, baseball, basketball, football and tennis. There are heated swimming pools and a bowling green. Some 70 miles southwest, Waterton Lakes National Park and Glacier International Peace Park provide skiing, fishing, hiking, camping and aquatic sports amidst Rocky Mountain scenery. The Lethbridge district

also offers opportunity for hunting. The Lethbridge Civic Centre is outstanding. Built in 1948, it covers four city blocks. Accommodation is provided for all sports. Its ice centre, with the largest covered artificial ice surface in Canada, brings many ice sports to the city. On the spacious grounds tennis, bowling, baseball, football and swimming are provided.

Shopping Centres

Shoppers World, built in 1955, contains all shopping facilities. Downtown Lethbridge is still the main shopping area with national and local department stores. Retail sales totalled \$60 million in 1956.

MEDICINE HAT

Transportation Facilities

The City of Medicine Hat is situated on both sides of the South Saskatchewan River, at its confluence with Seven Persons and Bullshead Creeks. It stands at the junction of Highways No. 1 and No. 3. Highway No. 1 is the Trans-Canada Highway, connecting the city with Calgary in the west (195 miles), Swift Current (161 miles), Regina (329 miles), and Winnipeg (697 miles) in the east. Highway No. 3 leads to Lethbridge and to British Columbia via Crowsnest. Starting eighteen miles east of the city, Highway No. 48 leads south to Wild Horse (98 miles), and Havre, Montana (142 miles).

The Canadian Pacific Railway's Crowsnest Pass line and transcontinental line have their junction at Medicine Hat. Bus services are operated to numerous places in Alberta and Saskatchewan, and there is a city bus service. The city is served by seven trucking companies which maintain depots at Medicine Hat.

Daily Trans-Canada Air Lines services, stopping at the city airport, connect Medicine Hat with Edmonton, Winnipeg and intermediate stops. The flying time to Edmonton is three hours 45 minutes, to Winnipeg five hours 30 minutes, including stops at intermediate airfields. A private company has aircraft available at the airport for charter flights.

Population

The city population in census years has been as follows:

1946	12,859
1951	16,364
1956	20,826

The trading area runs east to Maple Creek, north to the Town of Leader, northwest to Duehess, west to Grassy Lake, and south to the United States border. The trading area population in 1957 has been estimated at 60,000.

Labour Force

A labour force of 7,256 was recorded for 1957.

Climate

The altitude of Medicine Hat is 2,181 feet. The city has little rain or snowfall; its mean temperature is roughly that of Montreal, Quebec, but the daily extremes are greater. Mean daily maximum temperatures (55-year averages) are 22°F. in January and 84°F. in July. Medicine Hat has the greatest number of frost-free days of any locality in Alberta.

Geography

Crop production in the area surrounding Medicine Hat is limited by moisture, and soils are low in nitrogen; fertilizers and irrigation are required if crops other than grains are raised. The natural vegetation is short grass prairie, and the area is natural ranching country. Wheat is grown extensively and in years of good moisture there is an excellent yield of No. 1 quality. The St. Mary's irrigation project reached the district southwest of the city in 1955, and as a result many acres of land are being seeded to row and fodder crops.

Water Supply

Water is pumped from the South Saskatchewan River into city reservoirs. For domestic purposes there is a flat rate of a minimum of \$1.75 per month for a five room modern house. The rate increases 15 cents per month for each additional room. Commercial and industrial rates are from 30 cents to 15 cents per M.I.G., plus meter rental.

Fuel and Power

(a) ELECTRICITY: Three phase 60 cycle electric power is supplied by the city from their steam-electric power plant at the following rates:

Domestic

First 30 K.W.H.	6 cents per K.W.H.
Remainder	1.5 cents per K.W.H.
Minimum charge—\$1.00 per month	

Commercial Lighting

First 100 K.W.H.	4 cents per K.W.H.
Next 300 K.W.H.	3 cents per K.W.H.
Remainder	2 cents per K.W.H.
Minimum charge—\$1.00 per month	

Commercial Power

Demand Charge—	
Per H.P. connected or K.V.A. measured—\$1.00	
Energy Charge—	
First 100 K.W.H. used per month per H.P. or K.V.A.	1.5 cents per K.W.H.
Remainder	1 cent per K.W.H.

Minimum charge—the demand charge above but not less than \$5.00

Combined Light and Power

Demand Charge—

Per K.V.A. of measured demand during the current month or any of the immediately preceding eleven months—\$1.00 per K.V.A.

Energy Charge—

The first 200 K.W.H. used per K.V.A. of monthly demand	1.5 cents per K.W.H.
Remainder	1 cent per K.W.H.

Minimum charge—\$105.00 per month.

Industrial — 4,000 Volt Service

For power service to three phase motors of no less than 100 H.P. or 75 K.V.A. in rated capacity; use not less than 10,000 K.W.H. per month. All utilization equipment provided by the customer. Rate available only on standard power contract for five year period.

Demand Charge—

Per K.V.A. of measured demand during the current month or any of the preceding eleven months—\$1.00 per K.V.A.

Energy Charge—

First 100 K.W.H. used per K.V.A. of monthly demand	.75 cents per K.W.H.
Remainder	.5 cents per K.W.H.

Industrial — 13,800 Volt Service

For consumers who have a demand of not less than 500 K.V.A., and use not less than 10,000 K.W.H. per month. All utilization equipment provided by the customer.

Demand Charge—

Per K.V.A. of measured demand during the current month or any of the preceding eleven months—85 cents per K.V.A.

Energy Charge—

.33 cents per K.W.H.

(b) NATURAL GAS: Several industries own private gas wells, but supplement their requirements from city gas mains. Gas is distributed by the city at the following rates:

General

First 75 M.C.F. per month 30 cents per M.
Next 125 M.C.F. per month 24 cents per M.
Next 100 M.C.F. per month 22 cents per M.
All over 300 M.C.F. per mon. 18 cents per M.

Minimum Charge—\$1.00 for the first 100 M.C.F. then 50 cents per 100 M.C.F. based on the maximum monthly volume used in any current annual period. Discount 10 per cent, 20 days.

Combined Heating and Industrial

First 100 M.C.F. per month 19.0 cents per M.
Next 400 M.C.F. per month 16.5 cents per M.
All over 500 M.C.F. per m. 15.5 cents per M.

Minimum Charge—\$1.00 per 100 M.C.F. based on the maximum monthly volume used in any current annual period.

Large Industrial

Demand Charge—\$1.00 per 100 M.C.F. per month based on average monthly volume used in the then expired annual period, from 1st January to 31st December.

Fuel Rate

Up to 750 M.C.F.—14 cents per M.
Up to 2,000 M.C.F.—13.5 cents per M.
Up to 5,000 M.C.F.—11.5 cents per M.
Up to 15,000 M.C.F.—10.5 cents per M.
Up to 25,000 M.C.F.—10.5 cents per M.
All over 25,000 M.C.F.—8.5 cents per M.

Minimum Charge—The demand charge.

Taxation

The 1957 mill rate was composed of:

Education	32.5 mills
Library	1.5 mills
Municipal District Hospital	9 mills

	43 mills

Industrial Development

Medicine Hat has been called the gas city of the

West. Gas was first used industrially in the 1880's to burn lime in an open pit. Present industries using gas include five plants making pottery and ceramics, three major flour mills with a total daily capacity of 5,000 barrels, three brick and tile plants, one glass works, and 23 acres of greenhouses. A proportion of the products of the city's industry—bricks, sewer pipe, building tile, flue lining, ceramic ware, fresh flowers, and vegetables—find markets in many parts of Western Canada. During the winter months carloads of greenhouse vegetables and flowers are shipped from the city.

A nitrogen and phosphate fertilizer plant, with an annual capacity of 140,000 tons, has been built recently at an investment of \$25 million on the northern outskirts of the city. This plant, which went into production in 1957, incorporates a sulphuric acid unit working on elemental sulphur extracted from wet gas at Pincher Creek, in addition to nitric and phosphoric acid producing units. Its fuel and raw material supply is derived from gas from fields 50 miles south of Medicine Hat and phosphate rock from Monida, Montana. The fertilizer produced is marketed in Canada, the United States, and overseas. There are two large custom feed lots in the city.

At Redcliff, three miles to the northwest, a plant manufacturing glass bottles and jars employs 650 workers. Brickyards working on local clay are at the same location.

Building activity in Medicine Hat increased in 1956 to some 208 units as against an average new home building rate of 175 units for each of the eight preceding years.

The City of Medicine Hat owns a considerable acreage of land suitable for large or small industries. Utilities where not available can be provided, including low cost natural gas. Additional industrial sites are available near the city limits.

Amenities

Medicine Hat has been described as a city of trees and gardens. The long frost-free season, rich soil, and low-cost water supply have led to the development of fine gardens raising small fruits, corn, onions and other vegetables.

Schools offer courses in elementary and advanced vocational training, in addition to teaching

grades one to twelve inclusive. Dormitories to accommodate seventy students are operated for rural students attending the high schools. There is a business college situated in the city, a public library, a television station and a radio station. Health facilities include a new hospital opened in 1957 with a total of 250 beds and a nursing school. There are two homes for the aged.

Ample provision exists for many sports and recreational activities. Amenities include an arti-

ficial ice arena and ice and curling rinks, two golf courses, bowling greens, two swimming pools, and an athletic stadium. Game and game bird shooting are within easy reach of the city. The South Saskatchewan River, which flows through the city, provides fishing, as do Elkwater Lake, Newell Lake, and the waters in the Cypress Hills. In 1953 a Provincial Park was established in the Cypress Hills, the highest point between the Laurentians and the Rocky Mountains.

RED DEER

Transportation Facilities

The City of Red Deer stands approximately midway between Calgary and Edmonton, on Highway No. 2, the main north-south artery. It is served by both the Canadian Pacific and the Canadian National Railways; the latter line runs roughly west and east, while the former runs through the city in a northerly and southerly direction, with a branch line going west as far as Rocky Mountain House. Three companies operate local and long distance bus lines and there is a city bus service. There is an airport at Penhold, seven miles south of the city. There are two long distance haulage truck depots in the city.

Farms	8,000
Tractors	12,000
Cattle	110,000
Annual Milk Production	163 million pound

Climate

The altitude of Red Deer is 2,819 feet. The climate is bright and refreshing, with nights cool even after the hottest summer days. Mean daily maximum temperatures (30-year averages) are 21°F. in January and 73°F. in July.

Population

The city population in recent census years has been as follows:

1946	4,042
1951	7,115
1956	12,760

Its growth during the past ten years has, on a yearly percentage basis, been the most rapid of any Canadian city. More than 90 per cent of the city's inhabitants are of United States, British Isles, and Eastern Canadian origin.

The city's trading area runs from the Saskatchewan border to the Rocky Mountains, 50 miles south and about 60 miles north. The trading area's population in 1957 has been estimated at between 80,000 and 120,000. The agricultural importance of the area is shown by the following data:

Geography

The city lies in the Red Deer River valley; about nine-tenths of the population lives on the south bank of the river. A minor tributary of the Red Deer, Waskasoo Creek, also runs through the city. The river valley vegetation is well wooded parkland. The surrounding countryside lies in the Black Soil Zone, with soils which are among the most fertile in the province.

Water Supply

The city water supply is obtained from the Red Deer River. Its filtration and water softening plant has a capacity of 2.6 million gallons per day. The domestic water rate is 30 to 35 cents per 100 cubic feet. For commercial and industrial users the water rate ranges from 23 to 75 cents per 100 cubic feet. It is known that in addition to the river water there are adequate underground supplies available.

Fuel and Power

(a) **ELECTRICITY:** Electricity is supplied by Calgary Power Ltd. and distribution is undertaken by the City of Red Deer at the following rates per kilowatt hour.

	Lowest Scale Rate Available Cents per K.W.H.
Domestic	1.5
Commercial	2.0
Power (except off-peak)	1.5

Some of these rates are subject to discounts and service charges.

(b) **NATURAL GAS:** Natural gas is supplied by Northwestern Utilities, Limited from the Viking field. Its heating value is 960 B.t.u. per cubic foot at 60°F. Rates vary according to load factor, ranging as follows:

General Rates

First 3 M.C.F.	\$2.50 per month
Additional M.C.F.	\$0.38 per M.C.F.

Optional Rates (on annual contract where consumption is over 741 M.C.F.)

Fixed charge	\$10.00 per month
Usage rate	\$ 0.24 per M.C.F.

High Load Factor Rates

Fixed Charge —
\$20.00 per month plus
\$1.75 per month per M.C.F. of maximum 12-hour demand

Commodity Charge —

First 1,000 M.C.F. per month \$0.17 per M.C.F.
Next 1,000 M.C.F. per month \$0.15 per M.C.F.
All additional M.C.F. per month \$0.13 per M.C.F.

Taxation

The 1957 mill rate of 70 was made up of:

Municipal	26.5 mills
School	33 mills
Hospital	10.5 mills
—	—
	70 mills

Industrial Development

Red Deer is the market centre of the surrounding rich, mixed farming district and also acts as a distribution centre. Industries include the manufacture of cement products, diamond bits and drills, transformers, wood products, foods and beverages. Some of these are produced for a wide market, an example being the concentrated milk plant, the only such plant in Alberta. There are five grain elevators with a total capacity of 265,000 bushels.

With 70 per cent of the province's population living within a radius of 100 miles of Red Deer, it is the most centrally situated city of Alberta in relation to the province's population. As a result, a number of depots serving the whole province have been established at Red Deer by manufacturers of nationally-marketed goods. This development is likely to continue.

In the fall of 1956, the purchase was reported of 1,500 acres of land northeast of the city by the Polymer Corporation, for the possible construction of a \$12-\$15 million butadiene plant. The plant would operate on butane from a new gas processing plant located in the Nevis field. The manufacture of butadiene (a raw material for synthetic rubber) would stimulate Red Deer to even more rapid growth.

The city has an abundance of coal, gas, and timber within easy reach. Various sites are available for commercial and industrial development. Red Deer welcomes industry.

Amenities

There are excellent schools, including a composite high school for nearly 700 students, 400 of which can be accommodated on the campus. There is a public library. Health facilities include a 90-bed hospital.

There are skating and curling rinks, a golf course, and a great variety of other amenities for most summer and winter sports. The city is situated close to the summer resorts on Sylvan Lake, Gull Lake, and Pine Lake, at all of which there is good boating, swimming, and fishing. The Red Deer River is also well-stocked with fish, and good hunting country is found about 50 miles west of the city.

Industrial Districts

Details of industrial and commereial development locations at Red Deer are as follows:

One planned Industrial District inside the city—fully serviced and municipally owned. Another planned area immediately south of the city for large warehouses and manufacturing. To the north of the city, some planned warehousing and a major industrial site.

City Owned Light Industrial Area—100 aeres at approxiamtely \$2,000 per aere plus services.

Sewer, water, roads, gas, power and trackage installed. Building, set baek and performance standards in effect. Served by Canadian Paefic Railway. Interswitching facilities. Municipally-owned property. Close to No. 2 Provincial Highway and adjacent to Red Deer River.

South Light Industrial Distriet—100 aeres at \$1,500 per aere (privately owned).

Power and gas on property. Building, set back and performance standards in effect. Served by Canadian Pacific Railway. Privately-owned property subject to Distriet Planning Requirements. Adjacent to No. 2 Provinceial Highway

and Calgary-Edmonton Canadian Pacific Railway line.

North Warehouse District—80 aeres.

Warehouse and machinery and implement depots. Subject to performanee standards. Not served by rail. City power, services and gas available or can be extended.

Heavy Industrial Distriet—(Proposed)—750 aeres.

In planning stage. On old Canadian National Railways right-of-way—tracks removed. Adjacent to river. Cas and power easily available. Private property.

Heavy Industrial Distriet—(Proposed)—750 aeres.

Adjacent to existing Canadian National Railways and Canadian Paefic Railway trackage. Adjacent to Red Deer River and Blindman River. Adjacent to No. 2 Provincial Highway 4.5 miles from City of Red Deer along Provincial Highway. A number of oil wells in production on the site.

North Industrial District—100 aeres.

Heavy industrial zoned. This is a site for major development only. Adjacent to Red Deer River, Canadian National Railways can be extended to service the area; power and gas both available.

WETASKIWIN

Transportation Facilities

The City of Wetaskiwin is located 42 miles south of Edmonton on Highway No. 2 which links Edmonton with Calgary. Highway No. 13, leading east to the Saskatchewan border via Camrose, and Highway No. 19, leading west to Winfield via Pigeon Lake, terminate in the city.

Wetaskiwin is located on the main Canadian Pacific Railway line between Edmonton and Calgary and is a divisional point on the Edmonton-Winnipeg line via Camrose, Hardisty, Macklin and Saskatoon. Canadian Pacific diesel rail cars ('Dayliners') travel to Edmonton and Calgary in 45 minutes and 2 hours and 45 minutes respectively. Several bus services per day operate to and from Edmonton, Calgary, and intermediate stops on Highway No. 2. There are daily services between the city and Winfield via Pigeon Lake, and Maeklin, Saskatchewan, via Camrose. Truck serviees

operate to Edmonton and Calgary where transshipment is made of goods proeeeding to other parts of Alberta and destinations outside the province.

Population

The eity population in recent years has been as follows:

1946	2,645
1951	3,824
1956	4,476

The city's trading area measures some 1,600 square miles, extending 18 miles north, 12 miles south, 15 miles west, and 65 miles east of the city. The trading area population has been estimated at 16,000 to 18,000 persons.

Climate

The altitude of Wetaskiwin is 2,495 feet. The city has substantially the same climate as Edmonton: relatively cold but sunny winter, cool nights even after hot summer days, moderate snowfall and sufficient rainfall for successful farming.

Geography

Wetaskiwin lies on a plain whose natural vegetation is parkland—grassland invaded by woodlands of mainly deciduous trees. A high percentage of the surrounding district is arable. Wheat of fairly good quality is grown but mixed farming, frequently involving the use of fertilizer, tends to be the most profitable and most permanent type of agriculture in the area.

Water Supply

Water is obtained from wells by electrically driven centrifugal pumps. The first 400 cubic feet per two months are supplied at a minimum charge of \$5.00. Additional quantities are charged at the following rates:

Charge per 100 cubic feet
per two months

401 - 1,600 cubic feet	\$0.55
1,601 - 4,000 cubic feet	0.50
4,001 - 10,000 cubic feet	0.40
Over 10,000 cubic feet	0.30

Fuel and Power

(a) ELECTRICITY: Supplied by Calgary Power Ltd. at the following rates:

Domestic

Available only for lighting, heating, cooking, domestic power and other ordinary uses in private houses and individual apartments used exclusively for residential purposes.

First 20 K.W.H. (or less) per month \$2.30 Gross Minimum

Subject to 30 cents prompt-payment discount, making \$2.00 Net Minimum

All over 20 K.W.H. used per month 1.5 cents per K.W.H.

Note: Discount of 30 cents applies on all bills paid within the discount period.

The foregoing rate applies where the maximum demand does not exceed 5 K.W.

Where the demand exceeds 5 K.W. an additional monthly demand charge of 50 cents per K.W. will be made.

Commercial

Available where other rates listed do not apply.

Service Charge—

On the First 500 watts of installed capacity 60 cents per month

On each additional 250 watts of installed capacity 20 cents per month

Energy Charge—

First 50 K.W.H. per month per K.W. of installation 6 cents per K.W.H.

Next 150 K.W.H. per month per K.W. of installation 2 cents per K.W.H.

All over 200 K.W.H. per month per K.W. of installation 1.5 cents per K.W.H.

Minimum Charge—\$1.25 per month.

Power -

Available for motors, rectifiers, commercial heating apparatus, etc., in commercial establishments.

Service Charge—

\$1.00 per month per K.V.A. of installation, (one motor H.P. or one K.W. in resistance heating apparatus to be considered equivalent to one K.V.A.)

Energy Charge—

First 100 K.W.H. per month per K.V.A. of installation 3-1/3 cents per K.W.H.

All over 100 K.W.H. per month per K.V.A. of installation 1-2/3 cents per K.W.H.

Minimum Charge—\$3.00 per month, or the amount of the service charge, if greater.

(b) NATURAL GAS: Natural gas supplied by Northwestern Utilities, Limited, from Viking field has a heating value of 960 B.t.u. per cubic foot at 60°F. Rates are as follows:

24

General Rates

First 3 M.C.F.	\$2.50 per month
Additional M.C.F.	\$0.38 per month

Optional Rates (annual contract where consumption is over 100 M.C.F.)

Fixed Charge	\$10.00 per month
Usage Rate	\$0.24 per M.C.F.

High Load Factor Rates (minimum annual consumption, 12,000 M.C.F.)

Fixed Charge—	
\$20.00 per month plus	
\$1.15 per M.C.F. of maximum 12-hour demand.	

Commodity Charge

First 1,000 M.C.F.	\$0.17 per M.C.F.
Next 1,000 M.C.F. per month	\$0.15 per M.C.F.
All additional M.C.F. per month	\$0.13 per M.C.F.

Taxation

The 1957 mill rate was 61 mills, distributed as follows:

General	15
Debentures	6
Debentures	37.5
Hospital	2.5
	—
	61

Industrial Development

Wetaskiwin is in the centre of a good mixed

farming district, and of an excellent dairy district. It has a flour mill, grain elevators, stockyards, creameries and a variety of stores which serve the population of the city and its trading area.

Some 80 acres of land in the city has been zoned for industrial use; most of this can be served by public utilities, and a portion by rail. Additional land suitable for industrial use is available near the city. A planning report, prepared by the Town and Rural Planning Branch of the Provincial Government is scheduled for early completion, and the city's building code is being amended to conform with the National Building Code of Canada.

Amenities

Wetaskiwin has many substantial buildings, paved streets and sidewalks, and generally impresses visitors as a well-maintained and prosperous centre.

Schools provide instruction for grades one to twelve, and include a separate school for Roman Catholic students. One school has dormitory facilities; other students from surrounding rural areas are transported to and from school by a fleet of school vans.

Optional training offered by schools includes instruction in a range of commercial and technical subjects, handicrafts, music, arts and crafts, and home economics. There is a public library, and health services include a 60 bed hospital.

Most indoor and outdoor sports are catered for, including curling and golf. Lake resorts offering facilities for swimming and fishing include Mamme-O Beach provincial park on Pigeon Lake, 28 miles west of the city.

[illegible]

000023119621



B12648